

Lehman Brothers
A Casualty of Constructive Ambiguity?

Gerhard Flaaten

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The University of Bergen
Department of Comparative Politics

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Abstract

This thesis seeks to explain the US Government's role in the bankruptcy of Lehman Brothers in September 2008. It asks why Lehman did not find a solution in the market before it was too late, and why the Government did not bail Lehman out. The empirical account suggests that Lehman could have found a solution if this was its preference, and that the government did indeed, counter to the official explanation, have the power to rescue Lehman from bankruptcy. The thesis' stylized game theoretical analysis shows that the Government's choice of policy, displayed in how it dealt with events preceding Lehman's failure, provided Lehman with incentives not to find a market solution, which eventually resulted in Lehman filing for bankruptcy – the biggest in history sending shockwaves around the entire world. The analysis further shows that the Government's approach left it unable to credibly deter systemically important financial institutions from relying on a government sponsored safety net, which in the case of Lehman Brothers led to the sub-optimal outcome of bankruptcy.

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1 Introduction

Early in the morning Monday the 15th of September 2008 Lehman Brothers, America's fourth largest investment bank employing just under 26,000 people, declared bankruptcy in what would become the biggest bankruptcy filing in history. At this time, the bank had more than \$613 billion in debt (United States Bankruptcy Court 2008) and was borrowing over \$20 per \$1 it invested¹ (Lehman Brothers 2008). The demise of Lehman Brothers sparked the biggest shake-up on Wall Street in decades and sent shockwaves around the entire world.

There has been a big debate in the media and among economic and political commentators about how significant Lehman Brothers' demise was in worsening the current financial crisis. As Professor of Economics at Stanford University John B. Taylor (2008: 15) put it, "Many commentators have argued that the reason for the worsening of the crisis was the decision by the U.S. government (more specifically the Treasury and the Federal Reserve) not to intervene to prevent the bankruptcy of Lehman Brothers over the weekend of September 13 and 14". The debate over the significance of Lehman Brothers' bankruptcy for the health of the overall economy and whether or not government intervention should have taken place continues with undiminished strength today, one year after Lehman's bankruptcy filing. The demise of Lehman Brothers and its consequences for the US and global economy is also central to the regulatory debate that has emerged in the midst of the financial crisis.

My task in this thesis is not to add to the debate on whether or not Lehman Brothers' collapse contributed to aggravating the financial crisis. The fact that there is so much dispute about the topic, and the mere chance that non-intervention did indeed lead to a prolonged disruption of the financial markets, worsening the prospects for the real economy, is sufficient to call for further research regarding the reasons *why* government intervention was not offered to prevent the bankruptcy of Lehman Brothers, and why Lehman Brothers did not manage to find a solution to its problems before it was too late.

¹ Lehman reported a gross leverage (total assets divided by total stockholders' equity) of 21.1 in their 3rd quarterly report of 2008, down from a high of 31.7 in February the same year (Lehman Brothers 2008a).

The two interrelated puzzles that will be central to this thesis are that Lehman Brothers had ample time to find a solution in the form of either a merger with another company or a sale, yet the result was bankruptcy. The second puzzle is that the government did not step in to rescue Lehman from bankruptcy after having bailed out Bear Stearns, a smaller investment bank, six months earlier. I will in this thesis claim that after the bailout of Bear Stearns, Lehman Brothers had reason to expect the same treatment if they should encounter difficulties jeopardizing their continued existence.

There is reason to believe that Lehman's perception of what the government's preferences were if Lehman should come to the verge of bankruptcy had a serious impact on its reluctance to find a solution before it was too late. The explanation most prominent among analysts and reporters as to why Richard Fuld, the chief executive officer of Lehman Brothers, was not able to find a solution for Lehman, is that he overvalued the company and failed to realize the severity of the situation facing Lehman; Fuld was overplaying his hand, and doing it too slowly (McDonald and Robinson 2009, Wessel 2009). As to *why* Fuld overvalued the company, the reason commonly given is that he had worked there for too long, was not up to date on the newest developments of modern finance, and that he kept himself isolated, receiving all his information through a small number of people. I will attempt to demonstrate in this thesis that counter to this explanation the government's choice of policy provided Fuld with an incentive to drag his feet.

In this thesis I argue that first, it is possible that Fuld was in fact able to sell Lehman Brothers; the absence of a deal was due to Fuld preferring otherwise. Second, Fuld's reason for not wanting to seal a deal may have been that he anticipated a government bailout at the end of the road should Lehman default, and that this expectation was justified. Third, the incentive not to sell stemmed from the insecurity generated by the policy of constructive ambiguity chosen by the government.

My main argument will be that the policy of constructive ambiguity, where the government abstains from providing a clear message as to what criteria guides its provision of bailouts and what will be the eventual terms, worked counter to its intentions and contributed to a bankruptcy that could have been avoided. In order to

demonstrate this, I will perform an empirical case study of the events that occurred around the demise of Lehman Brothers utilizing game theory.

Analyzing the demise of Lehman Brothers sheds light on many of the central questions that remain unanswered after the bankruptcy of the investment bank: Why did the US Government rescue Bear Stearns, Fannie Mae, Freddie Mac and American International Group (AIG), but not Lehman Brothers? How does government policy influence the incentives of financial institutions? Is there reason to update our beliefs regarding constructive ambiguity as a policy option for regulators facing financial institutions in distress?

The following chapter gives an empirical account of the six months preceding Lehman Brothers' bankruptcy. Chapters 3 and 4 present the theoretical rationale for and against government intervention in order to rescue financial institutions from failure, and the options available for the government in intervening. Chapter 5 gives an account of the choice of method and discusses the methodological issues of relevance for this study. Chapter 6 analyzes the interaction between Lehman Brothers and the government by utilizing game theory, and chapter 7 provides a discussion of the results from the analysis before I round up with some concluding remarks.

2 Six months leading up to a fateful weekend

In this chapter I will give a brief introduction to the events on Wall Street during the months leading up to Lehman's bankruptcy, and immediately after. Wall Street, as well as the financial markets around the world, was experiencing unprecedented turmoil during the period in question. This chapter will elaborate on the events unfolding from the shotgun marriage of Bear Stearns with JP Morgan Chase in March 2008 through the demise of Lehman Brothers in September the same year. But first of all, what was Lehman Brothers?

2.1 Lehman Brothers

Lehman Brothers was an investment bank originally established in 1850 which had its main office in New York. Being an investment bank, it operated somewhat differently from what we associate with traditional banking. Commercial banks are what we most often think about when we hear the word “bank” – these are the institutions that take deposits from customers and lend out money to a person wishing to buy a home or a car, or a company wanting to expand (Lott 2007). Commercial banks are heavily regulated, and are subject to the Federal Deposit Insurance Corporation (FDIC) which guarantees all deposits up to a certain amount (temporarily increased from \$100,000 to \$250,000 through 2009). Commercial banks typically give long term loans, the amount and interest rate of which is derived from an assessment of the client’s creditworthiness.

Investment banks operate somewhat differently. An investment bank does not take deposits, and acts mainly as a broker for stocks, bonds and securities. However, a company can still go to an investment bank seeking debt capital. What happens then is that the investment bank assists the company in raising capital in the market by searching for an investor willing to put up capital for the client wishing to borrow (Lott 2007). In practice, the investment bank is in this case selling debt for its client. Thus it has no direct exposure to the client it is raising capital for; the investment bank deals mostly in papers. Investment banks are regulated by the Securities & Exchange Commission (SEC).

Having established what separates investment banking from commercial banking and what characterized Lehman’s business, we can explore the events that occurred during the months leading up to Lehman’s demise.

Lehman Brothers narrowly survived a fallout in March 2008 (Brunnermeier 2009), whereas Bear Stearns, Wall Street’s fifth largest investment bank had been acquired by its rival JP Morgan Chase. Lehman Brothers’ chief executive officer Richard S. Fuld Jr., who had worked at the investment bank for nearly 40 years after starting as a clerk straight after college, was receiving questions about the health of the bank ever since mid-July 2008. At the same time, the company’s shares were falling as seen in

Figure 1 below, its debt was downgraded, and investors seemed to be increasingly worried about Lehman defaulting (see developments in share price below). The situation bore striking similarity to the failure of Bear Stearns about four months earlier (Sorkin 2008a). Lehman's CEO Mr. Fuld attempted to convert the investment bank into a commercial bank which would be regulated under the Federal Reserve. The attempt was unsuccessful, allegedly because president of the Federal Reserve Bank of New York, Timothy F. Geithner, did not believe such a move would solve Lehman's problems (Sorkin 2008a, Onaran and Helyar 2008) and did not fancy the idea of an investment bank becoming a holding company (Nocera 2009). Throughout the following months leading up to Lehman's bankruptcy, Mr. Fuld discussed mergers with competitors, sent emissaries to Asia and the Middle East looking for money, and tried to find a commercial bank that could buy the whole company (Wessel 2009).

Figure 1: Developments in Lehman Brother's share price from early 2007 to its failure.



Source: <http://uk.finance.yahoo.com/> (Accessed 7th of July 2009)

Over a year previously, a round of talks to seek partners for Lehman had begun early in 2007, but the losses from subprime mortgages were already beginning to shake up the market, and discussions did not lead to results. With the fall of Bear Stearns in March 2008 things took an even worse turn for the financial market in general, and particularly investment banks. Lehman started discussing a merger with the British Barclays Capital in May (Brunnermeier 2009), and was also in contact with Korea Development Bank (South Korea) regarding a strategic investment. When the latter talks were leaked to the newspapers, the worry that Lehman lacked capital battered its

share price (Sorkin 2008a). JP Morgan Chase, the primary dealer of Lehman's trades, had already in the course of the preceding month requested more cash from Lehman to serve as collateral under concern that the trades it was making on behalf of Lehman were too risky (Sorkin 2008a, McDonald and Robinson 2009).

At the same time, Mr. Fuld was facing preliminary inquiries from federal prosecutors in New York who were investigating the company regarding its financial status, as well as investigations into whether Lehman had exaggerated the value of its commercial real estate holdings (Sorkin 2008a). Mr. Fuld said later in a testimony before the Congressional panel on the 6th of October (Committee on Oversight and Government Reform 2008) that he believed the bank to be in decent health until five days before its bankruptcy.

According to Lehman officials, they believed in the week preceding Lehman's bankruptcy that the firm had not one but two potential buyers ready to move if conditions were met; Bank of America and the British bank Barclays. Bank of America allegedly wanted the Fed to make a \$65 billion loan to cover exposure to Lehman's bad assets (Nocera and Andrews 2008a). Although the amount was double what the Federal Reserve (Fed) had made available in order to facilitate the takeover of Bear Stearns, Bank of America according to Nocera and Andrews (2008a) justified the request on the grounds that Lehman was larger. Barclays on its side allegedly wanted a guarantee from the Fed to protect against losses should Lehman's business worsen before a takeover could be completed (Ryan 2009).

Going into the weekend that would be the last for Lehman, on Friday the 12th of September 2008 at 06:00 the first of a series of emergency meetings at the Federal Reserve building in lower Manhattan began (Brunnermeier 2009). This meeting was called by Fed officials, and Treasury secretary Henry M. Paulson Jr. was also attending together with some of Wall Street's top bankers. A proposal was arrived at: they would divide Lehman into two parts, one "good bank" and one "bad bank". Bank of America or the British bank Barclays would buy the well performing part of the bank, while a group of 10 to 15 Wall Street companies would join together to fund the losses from Lehman's troubled assets. This was a way for Wall Street to avoid the consequences of an uncontrolled Lehman bankruptcy without the necessity of

spending tax payer money. The proposal was, according to Wessel (2009), not well received by Wall Street bankers, since Barclays would be buying a potentially profitable part of the investment bank while the banks absorbing the losses would be stuck with the bill. At this time it had also been explicitly stated to the public for the first time that no tax payer money would come forward to facilitate a rescue of Lehman Brothers from bankruptcy.

By Saturday the 13th of September, Bank of America instead turned its attention toward Merrill Lynch, believed to be next in line to steer toward bankruptcy if Lehman Brothers should fall. Paulson later allegedly claimed that Bank of America was never seriously interested in buying Lehman (Dodge and Mildenberg 2009, Ryan 2009, McDonald and Robinson 2009). Barclays pulled out from talks on the morning of Sunday the 14th (Sorkin 2008b). According to Wessel (2009), the reason was that the British stock-exchange listing stated that in order for Barclays to guarantee Lehman's liabilities so that it could open for business Monday morning, a shareholder vote was needed. Allegedly no shareholder vote could be arranged on such short notice, and the only way to bypass the rule was for the British Financial Services Authority (FSA) to waive it. The FSA refused to do so; hence a guarantee for Lehman's liabilities had to come from the Fed. With the Fed unwilling to come up with these temporary guarantees, there were effectively no potential buyers left for Lehman Brothers. The only real alternative to bankruptcy was thus the government taking on all of Lehman's liabilities without any prospects of a private sector solution in the near term.

2.2 Setting the stage for Lehman

The events during the months leading up to Lehman Brothers' bankruptcy are of interest to us because it is reasonable to assume that the management of Lehman Brothers shaped their perception of what treatment they would receive from the government based on how they had observed the government treat similar institutions in distress before mid-September 2008.

Bear Stearns' shotgun marriage

In March 2007, Bear Stearns, Wall Street's fifth largest investment bank, had been valued at \$18 billion. As mentioned, on the 17th of March 2008 Bear Stearns was acquired by its rival JP Morgan Chase for \$240 million. The deal was backed by a loan from the Federal Reserve (Fed) to cover \$29 billion in losses (New York Times 2009a). The trouble for Bear Stearns, as one of the country's largest underwriters of mortgage bonds, started when securities based on home loans started turning sour (New York Times 2009b), the technicalities of which will be thoroughly explored in the subsequent chapter. Two of its hedge funds that were heavily exposed to subprime mortgages went belly-up in the late summer of 2007, incurring major losses on the company (Hajim and Lashinsky 2007), and in December the same year it reported its first quarterly loss in its eight decade history (New York Times 2009b).

The market somewhat misinterpreted the establishment by the Fed of a special lending facility as having been put into place in order to help Bear Stearns specifically, and not the market in general, according to general counsel and executive vice president of the legal group at the Federal Reserve Bank of New York, Thomas Baxter (2009). This contributed to a run on Bear. In March 2009, after a weekend of intense negotiations, the Federal Reserve agreed to open a \$29 billion credit line to facilitate a JP Morgan Chase takeover of Bear Stearns for a price of \$2 per share, one tenth of the firm's price two days before (New York Times 2009b). The price was, however ultimately increased to \$10 per share (Brunnermeier 2009). In extending credit to an ailing investment bank, the Fed made an unprecedented and controversial move (Zaroli 2008). There was, however, ample uncertainty in the markets following the Bear Sterns intervention regarding the procedures and criteria for government intervention to prevent financial institutions from failing, as how that decision would guide future interventions was not made clear (Taylor 2008).

Fannie and Freddie bailed out

Just a week before Lehman Brothers declared bankruptcy, on the 7th of September 2008 Fannie Mae and Freddie Mac, two institutions which guaranteed or owned about half of the residential housing mortgages in the US (Brunnermeier 2009), were rescued by the government in one of the thus far largest bailouts in US history.

Treasury Secretary Henry Paulson justified the bailout by saying that the two firms' debt levels posed a "systemic risk" to financial stability (BBC 2009).

2.4 What was the source of Lehman Brothers' difficulties?

In order to answer this question we need to address the underlying causes for the subprime crisis. This section will provide the fundamental reasons that explain how the subprime crisis could take place, and through which mechanisms the crisis unfolded. As stated in the introduction to this thesis, my goal is not to add to the debate on what caused the crisis, yet it is necessary to understand the core concepts and trends that characterized and caused it. By examining the mechanisms that will be outlined here, we also gain a preliminary understanding of why governments even consider bailing out financial institutions that face bankruptcy.

Lehman Brothers' bankruptcy was rooted in what originally came to be known as the "subprime crisis" (Krugman 2009). Three trends in the US banking industry contributed strongly to the lending boom and the significant increase in housing prices (Brunnermeier 2009) which eventually sparked the subprime crisis. All three trends were central to Lehman Brothers' business model.

2.4.1 Increased securitization

The first trend contributing to the subprime crisis was increased application of the originate-and-distribute model, securitization which enables banks to move loans off their balance sheets. This practice enables banks to lend out more money – once a loan is moved off a bank's books, the bank can lend out more money and still abide to regulations. In the originate-and-distribute model, banks repackage (securitize) loans and pass them along to financial investors, offloading risk from their balance sheet. The model manifests itself when banks create so-called "structured" products such as collateralized debt obligations (CDOs). Once a bank has formed a diversified portfolio of mortgages, credit card- and other types of loans, it then slices the entire portfolio into different tranches and sells these to investors with different appetites for risk. The safest tranches, whose cut-off point is designed to achieve an AAA credit rating (the best), are paid out first from the cash flow in the portfolio, and

correspondingly holds a relatively low interest rate. The riskiest tranche, often referred to as “toxic waste”, is paid out only after all other tranches have been paid out. This tranche is usually held by the issuing bank to ensure that the bank monitors the loans adequately (Brunnermeier 2009).

The buyers of these tranches, as well as buyers of regular bonds, can protect themselves from defaulting loans by purchasing credit default swaps (CDSs). These are contracts insuring the holder of the tranche or obligation against default of the underlying asset. Estimates of the gross outstanding CDSs in 2007 range from \$45 trillion to \$62 trillion (Brunnermeier 2009).

Securitized and structured products are the backbone of financial operations. The securities that resulted from securitization became very popular for investors for several reasons. For instance, certain money markets and pension funds were only allowed to invest in the most secure, AAA-rated securities. Securitization allows for a tranche of AAA-rated securities to be extracted from a portfolio consisting of BBB-rated (lower rating) securities, hence as a result institutions were enabled to purchase securities they were otherwise barred from obtaining through regulation. Securitization also became very popular with banks, since the backstops did not go on their balance sheets, enabling banks to de facto be exposed to the same risk whilst having less of it on their books, i.e. allowing them to take on more risk than intended by regulation since they were enabled to hold less capital.

Structured products may have received disproportionately favourable credit ratings: Banks worked closely with the rating agencies in order to cut the senior tranches at exactly the “right” point in order to achieve the AAA-rating. Fund managers seeking the highest possible yield were attracted to buying structured products since they apparently offered high returns with only a small probability of any catastrophic loss (Brunnermeier 2009).

At the same time, the banking sector relied upon risk calculation models when pricing these securities that were flawed, having been developed without taking data from sufficiently bad times into the data sample. For example, these risk calculation models did not factor in the possibility of a fall in real estate prices as substantial as the one

experienced during the crisis which started in 2007 (Eichengreen 2008), making the pricing of risk inaccurate.

The popularity of securitized products ultimately led to a flood of cheap credit and deteriorated lending standards. On the premise that house prices could only rise, borrowers were given mortgages they would not be able to repay in the event that their economic situation deteriorated marginally, and monitoring was poor. The main reason for the latter is that the bank only intended to hold a newly granted loan on their books for a short while, after which the loan would form part of a structured product that would be moved off the bank's balance sheet and sold to investors. The result was a housing bubble which laid the basis for the ensuing crisis. Although there was a widespread belief that the day of reckoning would eventually come, it seems to have been a common notion that it was more profitable to ride the wave than to lean against it. As Chuck Prince, the former CEO of Citibank (which the US Treasury now holds a 30 per cent stake in) put it in July 2007: "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing" (Buiter 2009).

2.4.2 Maturity Mismatch

The second trend leading up to the sup-prime crisis was banks increasingly financing their asset holdings with debt of shorter maturity, thus increasing their exposure in the event of a freeze-up in the market for short term funding (Brunnermeier 2009, Greenlaw, Hatzius, Kashyap and Shin 2008). Investors prefer assets with short maturities, since this enables them to withdraw funds at a short notice in order to accommodate their own funding needs (Diamond and Dybvig 1983). It also serves as a means of disciplining banks with the threat of possible withdrawals (Brunnermeier 2009). Meanwhile, mortgages and investment projects have maturities of several years, even decades. This constitutes the maturity mismatch problem; financial institutions have long term obligations that they finance with short term debt.

In part, the maturity mismatch was transferred to what has become known as the “shadow banking system”, a system consisting of investment vehicles that were not included on the balance sheets of banks (Brunnermeier 2009). These off-balance-sheet investment vehicles, often referred to as Special Purpose Vehicles (SPVs) (Swan 2009), would raise funds by selling short and medium-term notes (maturity of 90 days to a year) primarily to money market funds. The short-term assets are called “asset backed” because they have a pool of mortgages or other loans as collateral, which the buyer has the power to seize should the asset backed commercial papers default. Since these off-balance-sheet investment vehicles invest in long term assets and borrow by selling short term papers, the SPVs are exposed to what is known as funding liquidity risk, in this case the risk that investors might suddenly stop buying asset backed commercial papers with the consequence that the vehicles find themselves unable to roll over (pay) their short term debt. In order to ameliorate such an eventuality, the sponsoring bank grants a credit line to the vehicle which is called a “liquidity backstop” (Brunnermeier 2009). In this way the banking system still in fact bears the liquidity risk from the maturity mismatch of holding long term assets while relying on short term loans. The risk just doesn’t appear on the banks’ balance sheets.

The maturity mismatch in the case of investment banks’ balance sheets is mainly a consequence of balance sheet financing with short-term repurchase agreements, so-called “repos”. A repo-contract means that a firm borrows funds by selling a collateral asset (like a commercial paper of some kind) today and promising to purchase it back at a later date. The growth in repo-financing largely consisted of overnight repo-contracts – the magnitude of such financing almost doubled from 2000 to 2007 (Brunnermeier 2009). The greater reliance on this extremely short maturity financing meant that banks had to roll over a significant part of their funding on a daily basis, thus leaving them very vulnerable to a reduction in funding liquidity.

2.4.3 Leverage

The third trend leading up to the subprime crisis was increased leverage. Leverage is defined as the ratio of total assets to book equity (Greenlaw et al. 2008) – that is how much the institution in question has borrowed in addition to its capital in order to magnify the potential outcome of an investment. For example, if an investment bank

operates with a leverage ratio of 20 [20-25 is a typical leverage for investment banks, 10-12 in commercial banks (Greenlaw et al. 2008)]it means that it will hold assets worth of 200 which is funded with debt worth of 190 and equity worth of 10. This way all changes in the value of a leveraged investment, negative as well as positive, are magnified, i.e. multiplied by the leverage ratio.

The leveraging (also called gearing) of investment banks in particular has implications for how they react when the value of their assets changes. Suppose that an investment bank seeks to hold a constant leverage level of 10; that is per \$10 equity it can hold a \$100 investment, financing \$90 of the investment with debt. If the value of the asset, let's say it is a security since investment banks typically trade with securities, increases by 1% to \$101, the leverage has fallen to $\$101/11 = 9.18$. Since the bank is targeting a constant leverage level of 10, it now has to increase its debt to match the increase in the asset value. In this case, debt financed securities worth of \$9 must be purchased in order to rebalance the leverage level to 10:

$$(\$101+\$9)/11 = 10$$

This mechanism also works in the opposite direction. Let's say that the value of the securities holding now falls to \$109. Leverage has now risen to $\$109/10 = 10.9$, and the bank will sell securities worth of \$9 in order to pay down \$9 worth of debt, restoring the leverage level of 10.

$$(\$109-\$9)/10 = 10$$

Hence when an investment bank is targeting a specific leverage ratio, a fall in the price of securities gives incentives to sell securities, while a rise in the price of securities gives incentives to buy. Investment banks in particular rarely target a specific leverage ratio over time – leverage tends to be higher during economic booms and lower relatively speaking during busts (Greenlaw et al. 2008). For instance, Lehman Brother's leverage ratio increased from 23.7 in 2001 to 30.7 in 2007 and 34.9 by the end of February 2008 (Lehman Brothers 2008). The balance sheet expanded correspondingly reaching its height in February 2008 with \$761 billion worth of assets (Swan 2009, Lehman Brothers 2008). The implication here is that in a global

financial market consisting of leveraged institutions, price fluctuations are magnified. When prices develop negatively, the potential disturbances from a downward spiral increase with the amount of leverage in financial markets. While the potential gains and losses from an investment increase with gearing, so do the potential systemic effects, since the debt implied by high leverage has to come from somewhere.

This chapter has provided insight into the main trends leading up to the crisis Lehman Brother's bankruptcy took place in. As seen, investment banks are particularly prone to engaging in the activities constituting the main trends leading up the sub-prime crisis. This enables us to better grasp why Lehman Brothers was likely to encounter difficulties during the crisis, and gives preliminary insight into what one could expect to be the consequences of its bankruptcy. It also gives a hint as to why government assistance may in some cases be called for in order to ameliorate the situation in financial markets, which will be explored in the next chapter.

3 Government intervention

While the above chapter outlined the concrete mechanisms through which the current crisis has unfolded, this chapter seeks to shed light on how financial crises appear from the governments' standpoint, and what the literature recommends should guide their strategies for ameliorating the consequences of such crises. What considerations are likely to be taken by government officials when deciding on how to address a financial crisis and facing important financial institutions in distress? The idea in this chapter is to make explicit the lenses through which regulators can be assumed to look when diagnosing a financial system and financial institutions, the trade-offs they are facing, and what guides their decisions in determining how to address the problem. This will form the basis for the analysis in this thesis of how the US government's preferences were shaped and what determined their strategy when deciding the fate of Lehman Brothers.

3.1 In favour of government intervention

Stern and Feldman argue in their book *Too Big to Fail, the Hazards of Bank Bailouts* (2004) that the main justification for governments intervening in financial system and providing help to financial institutions, is the belief that the cost of protecting institutions they deem systemically important from bankruptcy is smaller than the benefit they gain from avoiding the externalities of instability in the banking system and spill-over to the rest of the economy. In short, the rationale goes that protecting institutions that are systemically important helps preserve macroeconomic stability. Through the mechanisms that will be presented in the following, the rationale in favour of bailing out systemically important financial institutions states that the cost of the negative externalities that would follow is bigger than the economical and political costs that ensue from a bailout.

It is argued that systemic risk, a concept which will be explained subsequently, is a particular feature of *financial* systems (De Bandt and Hartmann 2000). While contamination effects (spill-over effects) are not exclusive to the financial sector but also occur in other economic sectors, the likelihood and potential graveness of such effects in the financial sector are regarded as considerably higher. This is primarily

because of the qualitative difference in externalities following in the wake of a financial institution in distress versus for example a car producer in distress. Mainly, the reason for this is that banks and financial intermediaries trade much more among themselves than do other businesses (Brunnermeier, Crockett, Goodhart, Persaud and Shin 2009). Before we can understand what constitutes systemic risk, we need to define what is a *systemic event*.

A systemic event is one in which “the release of ‘bad news’ about a financial institution, or even its failure, or the crash of a financial market leads in a sequential fashion to considerable adverse effects on one or several other financial institutions or markets, e.g. their failure or crash” (De Bandt and Hartmann 2000). Central in this definition of a systemic event is the “domino effect” that is implicit in the phrasing “sequential fashion”, where a shock is “transferred” from one institution or from one market to another. When institutions that are affected in the *second* round (institutions suffering not from the initial shock but from the domino effect) fail as a consequence of the initial shock although they were fundamentally solvent *ex ante*, this is referred to as contagion (De Bandt and Hartmann 2000).

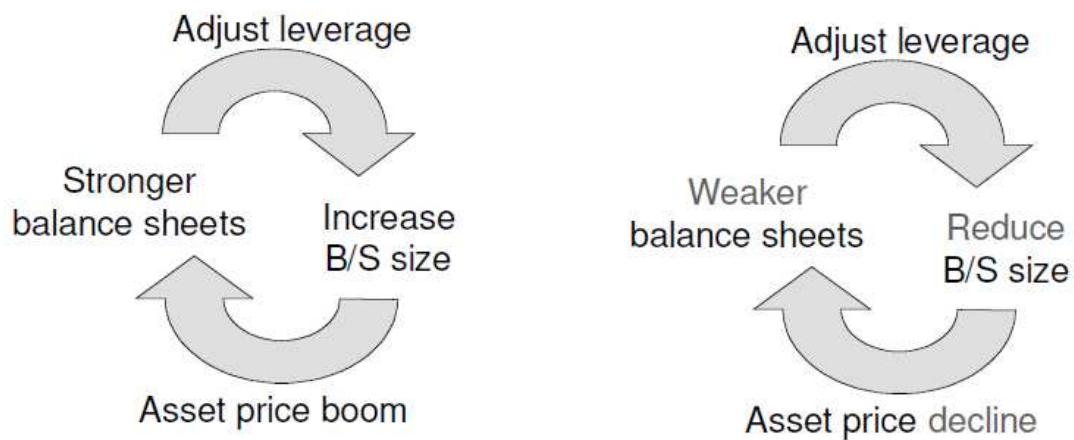
Based on this terminology, a *systemic crisis* is defined as “a systemic event that affects a considerable number of financial institutions or markets (...), thereby severely impairing the general well-functioning (of an important part) of the financial system” (De Bandt and Hartmann 2000, parenthesis in original). According to this definition, the sub-prime crisis no doubt qualifies as a systemic crisis.

There are different theories in the literature that define systemic risk in different ways. One of these is postulated by Kaufman and Scott (2003), who define systemic risk as the “probability that cumulative losses will accrue from an event that sets in motion a series of successive losses along a chain of institutions or markets comprising a system ... That is, systemic risk is the risk of a chain reaction of falling interconnected dominos”. The Bank of International Settlements (BIS) operates with a similar definition, namely “the risk that the failure of a participant to meet its contractual obligations may in turn cause other participants to default with a chain reaction leading to broader financial difficulties” (BIS 1994).

Another definition of systemic risk focuses on spill-over from an exogenous shock, but does not postulate that there is a direct causation like a domino effect where one institution's default inflicts default on the institutions exposed to it. According to this theory, third party observers perceive that an institution has experienced adverse effects from an exogenous shock. The third parties then assess the situation, and look at which other institutions bear similarities to the one that has failed, since they assume that high similarity signifies a high risk of the institution in question suffering a similar fate. The higher the third parties assess the similarity to be, the higher the perceived risk of failure, and thus the stronger the incentive to withdraw funds, suspend trade etc. to isolate oneself from the perceived risk (Chari and Jagannathan 1988, cited in Freixas, Gianni, Hoggarth and Soussa 2002).

Brunnermeier et al. (2009) argue that contagion needs not necessarily be preceded by a default – a change in prices or in measured risks may in fact be enough: When financial institutions mark their balance sheets to market – that is they consider the market price of their assets and similar assets to be the balance sheet value of such assets (Kambhu, Weidman and Krishnan 2007, Brunnermeier et al. 2009) – a change in market prices has far-reaching consequences. The key to the rationale is *feedback effects*. If increased demand for an asset creates upward pressure on its price, then, if financial institutions target a specific leverage ratio, there is potential for a feedback effect in which stronger balance sheets create an increase in the demand for an asset, which in turn raises the price of the asset and leads to stronger balance sheets. Having come full circle, the feedback process can go through another round. This mechanism is illustrated in Figure 1:

Figure 2: Liquidity Spirals – the procyclicality of asset price changes



Source: Brunnermeier et al. 2009b: 15, Figure 4

In downturns, as illustrated on the right in Figure 1 above, the mechanism works in reverse. Consider the case in which an asset that is widely held by hedge funds and banks experiences a drop in its price. Because of the magnifying properties of leverage, the net worth of institutions holding the asset can potentially fall faster than the rate at which the asset itself falls in value since all movements in the asset price are multiplied by the leverage ratio on the institution's balance sheet, thus causing the equity cushion of the institution in question to diminish. One way for a financial institution to restore its equity in a situation like this is to sell off assets in order to pay down debt. As seen to the right in Figure 1, this adjustment of leverage reduces the institutions' balance sheet and has the effect of fuelling further decline in the asset price, which in turn further weakens the balance sheet and encourages further deleveraging. This way, default is not a necessary condition for generating contagion – a mere price-change can prove sufficient since other institutions which are leveraged also have to adapt their balance sheets to the price changes.

Furthermore, as asset prices drop, risk measures increase. Risk managers in banks put on the brakes and compel traders within a bank to deleverage their positions. This is exactly what Lehman Brothers did in order to adjust to the diminishing value of its

real estate holdings, as we shall see later. Like we have seen, deleveraging is procyclical, and when numerous market participants de-lever simultaneously in a stressed environment, liquidity simply evaporates from the market (Brunnermeier et al. 2009). The liquidity spirals that result from the self reinforcing effects that follow from price changes when financial institutions mark-to-market are the underlying cause of the procyclicality in the financial system. Hence central bank officials can find justification for government intervention in the financial markets even when there is no imminent danger of defaults

The common denominator for all the theoretical approaches outlined above is that of externalities, and how a systemic event can spread through the financial system if it is not addressed. Systemic risk, as seen, means the same as the risk of contagion – the spread of negative externalities from one or more financial institutions to parts of or the entire financial system. The different theories present different rationales for which mechanisms transfer systemic risk from systemic events to the system. Without taking a stance as to which of the presented theories is most plausible in explaining the mechanism thorough which systemic events can impose contagion on financial system (the theories presented can be seen as complementary), we have seen that the literature provides a grim picture of how the financial system can be at risk when systemic events occur. This can be seen as justification for why governments should intervene when facing systemically important financial institutions on the verge of bankruptcy. The spread of negative externalities impact the economy as a whole, and this concern about spill-over is easily converted to protection of uninsured creditors for policymakers. How policymakers explain this fear of spill-overs needs be addressed to understand how the fear of systemic risk is converted to bailouts.

According to Stern and Feldman (2004), the fear of disruption in the financial system stems from a perception that banks are the oil in the machinery that greases day-to-day economic activity. Through the mechanisms that have been outlined above, systemic events can lead to payment systems freezing up and availability of credit going down with a negative effect for the real economy though increased unemployment and reduced production. Another reason given is that even the largest and most well-respected financial institutions can run into severe financial problems like runs that leave them with dark prospects of survival (Stern and Feldman 2004).

Diamond and Dybvig (1983) write that any external event that can make depositors believe that other depositors will withdraw their funds, can potentially cause a bank run. For investment banks, creditors not renewing their loans in effect has the same consequences as a bank run (Brunnermeier 2009). The proponents of government intervention claim that intervention is necessary and desirable to avoid these negative effects and market inefficiencies in order to maintain macroeconomic stability (Stern and Feldman 2004).

Nevertheless there is also theoretical justification for *not* intervening in the economy in order to rescue significant financial institutions. Besides the ideological aversion by some scholarly traditions on this subject, the rationale presented mainly has to do with the cost of intervention, again with principal focus put on externalities.

3.2 Against government intervention

The main argument against government intervention is that it creates expectations of further intervention, which alter incentives for management of financial institutions: If the market observes that financial institutions in distress are bailed out, it fosters the expectation that once an institution is considered to be TBTF, the government will not let it fail. The expectation that the government will bail out systemically important financial institutions if they encounter difficulties that would jeopardize their further existence, is the perception of a subsidy to the financial institutions that are considered TBTF; an extra insurance that they do not pay for (Rochet and Tirole 1996).

This insurance, perceived or real, imposes moral hazard on the financial system. Freixas et al. (2002) define moral hazard as arising when “the provision of insurance, by modifying the incentives for the incurred party to take preventive actions, increases the probability of occurrence of the event being insured against.” Moral hazard is inherently forward-looking: an episode creates moral hazard in that it shapes expectations of how a similar episode will be handled in the future. In the financial institutions, intervention from the government may yield the expectation that the institution is virtually insured against all kinds of risk, including those that come naturally with the provision of credit and ordinary market operations (Freixas et al.

2002). This type of perceived (if not real) insurance provides the institution in question with certain benefits and advantages vis-à-vis institutions that are not perceived (perhaps equivocally) to be covered by such an insurance.

Hence, there exists an incentive for banks to seek becoming TBTF in order to be able to enjoy the subsidy and insurance that comes with it. One may argue that financial institutions which are not eligible for government insurance like FDIC deposit insurance, i.e. largely unregulated enterprises like hedge funds and investment banks, have an even higher incentive to become regarded as TBTF by the government, since achievement of such status would reduce the risk of their operations significantly. Institutions that are considered TBTF are also likely to receive special treatment by the general market in terms of increased access to funding. With the cost of funding being lower than what the riskiness of the operations otherwise would imply, a bank has an incentive to increase the risk, which leads to a higher expected potential return (Rochet and Tirole 1996), but also a misallocation of resources for the economy as a whole (Stern and Feldman 2004).

Furthermore, government assistance when given provides bank managers and shareholders with an incentive to engage in excessively risky projects in order to utilize the subsidy that is implicit in such a rescue to the fullest – the so-called gamble for resurrection. Another effect may be that if the market knows that the government will possibly intervene to rescue a failed financial institution from bankruptcy, this decreases the incentive for uninsured creditors to monitor as closely the behaviour and performance of the institutions they have lent to (Freixas et al. 2002).

The intention of this chapter was not to conclude with regard to whether or not governments should provide assistance to financial institutions in distress. As we have seen, there are strong arguments both for and against government intervention. Nevertheless, in this chapter we have seen which factors are likely to be taken into consideration when government officials decide what strategy to choose when facing financial institutions in distress. In the following chapter we will explore what are their options.

4 The menu of options

A government, meaning the central banks and the financial departments in general and the Federal Reserve and the Treasury in the US, has several options on how to address a financial crisis and financial institutions experiencing difficulties. First of all, the literature describes three broad policy approaches a government can take: do nothing, rescue some, and rescue all. If a government chooses one of the two latter policies, a range of different means for intervening are available. The following will present the theoretical rationale for the different policy approaches, and elaborate on the technicalities and juridical prerequisites for the different means of intervention.

4.1 Policy options – The broader approach

Before exploring what concrete actions were available for the US government when it came to deciding the fate of Lehman Brothers, I will present the broader approaches governments can choose when facing financial institutions in distress. The first of these is to do nothing out of the ordinary, and let financial institutions in trouble fail if they are not able to find a solution in the markets. Such a solution may be raising additional capital, a sale, a merger, obtaining new loans or in any other way avoid bankruptcy without government intervention.

4.1.1 Save all

Governments can also do the exact opposite of the above, and assure financial institutions that measures will be taken to keep all significant financial institutions afloat – a way of dealing with the problem of systemic risk in a financial system (Dabós 2004). This policy is called the too big to fail (TBTF) doctrine, and states that government *will* intervene to prevent large institutions (most commonly banks) from failing. The institutions that fall under this category are the ones labelled as “individually systemic” in the terminology of Brunnermeier et al. (2009). What the policy implies is that once an institution is considered to be individually systemic, you cannot let it fail, as that would impose intolerable systemic risk on the system.

The concept was born in September 1984, after the bailout of among others Continental Illinois in May that year, when the Comptroller of the Currency testified before the US Congress that some banks were in fact deemed too big to fail, and that these banks could enjoy complete deposit insurance (O'Hara and Shaw 1990), that is insurance that exceeds the regular deposit insurance. The Comptroller of the Currency did not explicitly name the banks that were in fact considered TBTF, but he agreed to that the doctrine would encompass the country's eleven largest banks (O'Hara and Shaw 1990).

Rochet and Tirole (1996) as well as Stern and Feldman (2004) emphasise that mere size is not the only criteria for qualifying as being TBTF. They present empirical evidence that very large institutions, for example Enron, have been allowed to fail, as long as they represented little risk of contagion, that is, their level of interconnectedness was not sufficient to pose systemic risk. I will refer to both institutions that are too big to fail and too interconnected to fail as TBTF, since differentiating between the two is not of significance to the analysis in this thesis; both kinds of institutions are perceived to pose systemic risk if they are allowed to fail.

4.1.2 Mix it up

Another broad policy approach defined in the literature is that of constructive ambiguity, which essentially is a policy based on creating uncertainty. A formal definition of the concept constructive ambiguity is hard to pin down, but an informal definition can be found in a G 10 report which states that:

“...any pre-commitment to a particular course of action in support of a financial institution should be avoided by the authorities, who should retain discretion as to whether, when and under what conditions support would be provided. In addition, when making such a decision, it is important to analyze rigorously whether there is a systemic threat and, if so, what options there may be for dealing with systemic contagion effects in ways that limit the adverse impact on market discipline.” (Group of Ten 1997)

Hence constructive ambiguity produces uncertainty as to whether intervention will take place at all, exactly when it will take place if it does, and what the eventual terms of such intervention will be in each individual case. It also allows the government to keep all doors open and extend the time frame for decision making, as the decision of how to deal with a failing financial institution can be put off until the last minute.

The rationale for keeping the conditions attached to liquidity support ambiguous is to keep managers and shareholders uncertain about the cost they would have to bare if illiquidity or insolvency should result from imprudent behaviour. The argument goes that constructive ambiguity is better than an explicit extension of the “safety net” through committing to the TBTF doctrine – through ambiguity one at least succeeds in keeping more institutions uncertain about their TBTF-status, increasing market discipline.

What first and foremost speaks against the utility of constructive ambiguity is the amount of discretion it places in the hands of the ones responsible for crisis management. This discretion spurs the time-inconsistency problem: “while it is in the interest of the authorities to deny their willingness to provide a safety-net, *ex post* they may later find it optimal to intervene” (Freixas et al. 2002, italics in original). The implication is that the authorities according to this rationale can be expected to threaten that no safety-net will be provided (or at least abstain from announcing that one *will* be provided), even if this is not their true intention or preference. In addition, the lack of transparency inherent in this approach to dealing with a crisis situation enables authorities to not be obliged to justify applying different remedies to situations perceived as identical to the public (Freixas et al. 2002).

Furthermore, the honeymoon period of the increased market discipline mentioned above comes to an end once a bailout occurs (Stern and Feldman 2004). Policymakers cannot be expected to act randomly even when constructive ambiguity apparently or explicitly drives their policy, hence once government assistance has been delivered to one institution, much of the ambiguity has been eliminated, and the market and institutions in the market will soon start guessing who is covered and under which circumstances (Stern and Feldman 2004). As Charles Goodhart of the London School of Economics put it, “This genie cannot be put back in the bottle...Central banks

cannot expect in future to enforce good behaviour in bank asset management by some constructive ambiguity on whether to withhold liquidity assistance. Their actions have spoken louder than words” (Hilsenrath, Reddy and Wessel 2009).

As an analogy to why constructive ambiguity can create suboptimal results, one may consider the game of poker: essential in order to become a winning poker player is to “mix up your game”. What this means is that you shouldn’t always play a hand the same way, or act in the same manner every time a given situation occurs. If you do, your actions become predictable, as your opponents will observe a pattern and use it to their advantage to outplay you in the hand. If you mix up your strategy and play identical situations differently, you keep your opponents guessing. This is a winning strategy in poker, but not necessarily a winning strategy in dealing with financial crises. The reason is that leading your opponents to believe that you always play a hand the same way in poker, gives you an edge when you suddenly play the hand differently and bust your opponent. In a financial crisis, one of the last things government officials want to do is bust their “opponents”.

4.2 Insolvency or illiquidity

Having explored the broader policy options available for government officials in addressing financial institutions in distress, we move on find which concrete actions the government can take. However, before the government can decide what kind of remedies (if any) it will apply to keep financial institutions from bankruptcy, it needs to assess in each case whether it is dealing with illiquid institutions, or insolvent ones. The distinction between insolvency and illiquidity is a very difficult one to make, and one of much importance for authorities when choosing the path they should take. Goodhart (1995) notes that “the time scale required for making a decision as to whether to lend to a bank often is too short to allow firm conclusions about its solvency”. Hence the possibility always exists that a financial institution which is apparently suffering from illiquidity problems (that is basically sound, but temporarily experiencing difficulties obtaining access to financing), is in fact insolvent. Government officials hence need to establish an opinion on whether the institution in question does not have sufficient capital, or is just not able to meet its obligations on

time. The implication of this opinion is this: if the government provides financial assistance to an illiquid institution, it is in most cases considered a loan. If the government provides financial assistance to a financial institution that is known or highly likely to be or become insolvent, it is capital provision, i.e. a bailout.

4.3 Liquidity provision

As we have seen above under the rationale in favour of government intervention, liquidity provision by the central bank can be called for under special market conditions. With regard to the possibility for Lehman Brothers to borrow from the government, prior to Bear Stearns' bailout in March, the Fed had opened new possibilities for lending to non-depository institutions through the discount window (Wessel 2009, Moyer 2008). The authority to do this was found in Section 13 (3) of the Federal reserve Act, providing the Fed with emergency lending powers in "unusual and exigent circumstances" (Baxter 2009), a statute that had not been used to lend money for 70 years until the 11th of March 2009 when the Term Securities Lending Facility (TSLF) was established. The goal of this facility was to lend Treasury securities to financial institutions, taking their mortgage-backed securities (MBS) as collateral in an attempt to alleviate the liquidity problems in broker-dealers (Baxter 2009).

In order to ameliorate the situation after Bear Stearns had been acquired by JP Morgan Chase, the Fed opened another lending facility, namely the Primary Dealer Credit Facility (PDCF), which could lend dollars against securities. This was also done under Section 13 (3), and starting on the 17th of March 2008 primary dealers had access to credit from the Federal Reserve through this facility (Baxter 2009). The scope of institutions that could borrow from the discount window was hence expanded together with the array of collateral that would be considered as approved collateral to lend against.

Lehman Brothers lent a small amount from the discount window once after the creation of the PDCF (Wessel 2009), and later once on the 16th of April for testing purposes² (CNBC 2008).

4.4 Capital provision – Bailout

There are cases in which the stability of the financial system can be threatened by the failure of a bank that is *obviously insolvent*. During the current financial crisis it became apparent as the crisis unfolded that the system was not suffering from lack of liquidity, but rather was experiencing a problem of insolvency, which has different implications for how the response should be orchestrated (Freixas et al. 2002).

In a situation such as described above it may be better for the authorities to inject capital at an early stage than to provide liquidity support on a later stage (Freixas et al. 2002). The rationale for this is that it may prove cheaper to restructure an insolvent bank than to allow it to fail, mainly because the liquidation value of a bank may be lower than its market value (James 1991, cited in Freixas et al. 2002). Guttentag and Herring (1983, cited in Freixas et al. 2002) make the same point when writing that “banks usually are worth more alive than dead even when their net worth alive is negative”. This may justify the takeover of bad banks by good banks, and some argue that when this cannot be achieved, the public sector should inject money and restructure the bad bank as long as the benefits outweigh the costs (Freixas et al. 2002). In technical terms, what could the government have done in order to keep Lehman from failing once it became clear that the investment bank was already or in most likelihood soon to be insolvent?

Backstop a merger through issuing a guarantee for toxic assets

In the bailout of Bear Stearns, the Federal Reserve created a Special Purpose Vehicle (SPV) to which it lent approximately \$29 billion, whereas it lent \$1 billion to JP Morgan Chase. Under section 13 (3) the SPV used the loan to acquire the toxic assets

² The Fed does not provide information regarding *who* has accessed the discount window, but does inform *whether* the window has been accessed. If Lehman or any other institution with access had borrowed from the discount window while Lehman was presenting quarterly reports with negative numbers, the market would assume Lehman was the one borrowing from the discount window, which would incur stigma on Lehman. Hence Lehman had reason to be reluctant to access the PDCF.

of Bear Stearns, making it “digestible” for JP Morgan Chase. This can be viewed as provision of capital support as discussed above. The assets were held as collateral, and the time frame of the loan was 10 years. JP Morgan Chase would take the first \$1 billion of potential losses (Baxter 2009).

Provide a direct loan

The government could also have provided a loan directly to Lehman Brothers, like they did with AIG the day after Lehman filed for bankruptcy. In the bailout of AIG, the Fed made a two-year loan of up to \$85 billion and, in return, received warrants that could be converted into common stock, giving the government nearly 80 per cent ownership of the insurance company. The entire holding of assets in the company was held as collateral against the loan (Andrews, de la Merced and Walsh 2008).

Buy Lehman Shares / Nationalization / Conservatorship

It is also conceivable that Paulson could have injected capital into Lehman Brothers directly. This is in fact what was done with other companies after the TARP legislation was signed into law. It is possible that Paulson, in juridical terms, could have done this with Lehman Brothers even before the TARP legislation had been passed through Congress.

I argue that the option that we most likely would have seen put into place if a bailout had occurred, would have been that of backstopping a merger through issuing a guarantee for toxic assets, like the bailout for Bear Stearns. I base this on a statement by Thomas Baxter, who has been introduced previously in this thesis, that “Plan A was to prepare a Bear Stearns-style rescue, plan B was the alternative case” (Ryan 2009). This means that in the analysis of this thesis, the strategy BAILOUT for the government will most of the time result in an arrangement similar to that which was put into place for Bear Stearns, as described above.

4.5 Other measures

Other options to avoid a Lehman bankruptcy were also available for the government, like the two presented below. These were, however, options that would have a much

higher probability of success if they had been implemented early in the period from Bear Stearns' fall to Lehman's demise.

Dividing Lehman into one good bank and one bad bank

Fuld tried to spin off all of Lehman's commercial and residential real estate positions, which were the corporation's most troubled assets, in a single entity that was going to be called SpinCo (McDonald and Robinson 2009). This was supposed to bring down Lehman's exposure to bad assets and bring down its leverage, but the entity could not be established until January 2009, four months ahead in time (McDonald and Robinson 2009). Additional funding would be required to cover the losses that were likely to be incurred on SpinCo if the value of its assets kept deteriorating. This would either have to come from the government or the other banks on Wall Street. As seen, both declined to backstop a Lehman bad bank.

Converting Lehman Brothers to a bank holding company

As seen above, this was suggested by Fuld in July 2008, but allegedly stopped by Timothy Geithner of the New York Fed. Such a conversion would effectively turn the investment bank into a commercial bank, and provide Lehman with the benefit of increased access to borrowing from the Fed. It would also allow Lehman to take deposits. On the other hand, stronger regulation would be imposed on Lehman, restricting their reliance on leverage (Irwin and Appelbaum 2008). Two other Wall Street investment banks, Goldman Sachs and Morgan Stanley, were converted to bank holding companies on the 21st of September 2008 (FED 2008).

5 Method and data

In this chapter I present and discuss my choice of method as well as methodological issues related to this study. The strengths and weaknesses of my approach will be discussed in the following.

5.1 Case study

This thesis is a case study of the interaction between Lehman Brothers and the US government in the period between mid March and mid September 2008. A case study is defined by John Gerring as “an intensive study of a single unit for the purpose of understanding a larger class of (similar) units”. A unit is defined as a “spatially bounded phenomenon...observed at a single point in time or over some delimited period of time” (Gerring 2004: 342). The unit of analysis in this thesis is the interaction between Lehman Brothers and the government. The study is of both temporal and within-unit variation: According to Gerring’s typology (2004: 343), this study is a type III case study, since the primary unit is broken into sub-units (Lehman and the government) which are subjected to covariational analysis synchronically and diachronically.

Gerring (2004: 347 - 352) presents some general trade-offs that move along seven dimensions with regard to case studies. I present each of them in turn and discuss how they relate to my thesis, before proceeding with the implications of using game theory in the analysis. The first trade-off is between descriptive and causal inference, the first being about *what?* and *how?* while the latter deals with the *why?*. The primary motivation for studying the interaction between Lehman and the government in this thesis has been to explore what causal relationships lay behind the outcome. However, in order to analyze the *how* one cannot get around understanding the *what* and the *how*. Although this thesis is fundamentally an attempt to arrive at a causal understanding, descriptive aspects make up a large part of the basis for analysis.

The second trade-off is concerned with the scope of proposition, namely breadth versus depth: knowing less about more or more about less. Although the introductory

chapters place Lehman Brothers in context by adopting a somewhat wider approach, I regard this study do be a clear cut case of the latter type.

Trade-off number three deals with case comparability versus representativeness – unit homogeneity. Comparability in a single-unit study is by definition likely to be high, since all cases are drawn from the same unit. Representativeness, on the other hand, is presumably low, since this would require the causal relationship evidenced in the unit of analysis to be present also in a larger set of units (Gerring 2004: 348). While the stylized presentation of the primary unit of analysis in this thesis increases the potential for generalization somewhat, idiosyncrasies inherent in the in-depth study may inhibit such effort. Although this is the study of an instance that constitutes part of a broader phenomenon (how governments deal with financial institutions in distress), I can by no means recommend without reservation that my findings be applied to the many other contemporary instances where financial institutions are in distress and governments have to decide how to deal with them.

The fourth addresses what kind of insight into causation one can achieve by examining empirical evidence of a particular X:Y relationship. The distinction presented by Gerring (2004: 348) is between causal effects versus causal mechanisms – examining *how much* Y is affected by a given change in X as opposed to *how* Y is affected by X. On the sub-unit level, this thesis does operate with some estimates of how much the actors' utility from choosing different strategies are affected by certain elements, and a critical value of the perception of probabilities is put forward as triggering factor for specific outcomes (see chapter 6). With regard to the primary unit, however, a proposition is put forth regarding *how* the policy of constructive ambiguity affects Lehman's choices, which is discussed in chapter 7. In other words *what* and, *how much* is here regarded as critical in establishing *how*.

The fifth has to do with the nature of the causal relationship, namely whether it is deterministic (invariant) or probabilistic in nature. The causal relationship put forward in this stylized study is deterministic in that given a certain set of background circumstances (which are necessary and sufficient), a specific outcome will be produced. For example, in my analysis, Lehman's perception of the probability that the government will prefer to bail it out should it face bankruptcy has a specific

critical value above which Lehman will choose not to sell the company and below which it will prefer to sell – a necessary but not sufficient condition in an invariant causal relationship.

The sixth trade-off discriminates between exploratory and confirmatory strategies of research. My study is exploratory and can hopefully contribute to theory development in that it seeks to identify what calculations lead to Lehman Brother's bankruptcy, more concretely the absence of a sale followed by the absence of a bailout. It is also theory testing in the sense that it ties the theoretic rationale behind the policy of constructive ambiguity to the case of Lehman Brothers' bankruptcy and evaluates to what extent the policy achieved its purpose.

The seventh and last trade-off is concerned with useful variance, and states that the study of one unit may be more useful than studying several units that attempt to mimic the experimental method with statistical evidence. In other words, not all variation is useful variation, and if useful variation is not available, the case study is a viable approach (Gerring 2004: 350). Systemically important financial institutions that have actually been allowed to go under are a scarcity in the empirical universe, therefore an intensive study may be warranted as opposed to a wider cross-unit analysis.

5.2 Game theory

This study's analysis will rely on game theory. Game theory is an invaluable tool when it comes to parsimonious modelling of empirical incidents involving actors who act strategically. It constitutes a subfield of Rational Choice (RC) theory, and the approach is based on what Tsebelis (1990) names the *rationality assumption*. This holds that human activity is goal oriented and instrumental, and that "individual and institutional actors try to maximize their goal achievement". The focus of game theory is set on how actors "choose the means to best gain a set of ends" (Gates and Humes 1997: 8). While the concept of rationality is somewhat contested in the literature (Green and Shapiro 1994, Gates and Humes 1997, Hovi 1998, Tsebelis 1990), the central and mainly uncontested areas that RC encompasses are utility maximization, structuring of preferences, decision making under conditions of uncertainty and, on a

broader basis, the centrality of individuals in the explanation of outcomes (Green and Shapiro 1994). The basic orientation of game theory is to develop general explanations, that is identifying equilibrium conditions in order to develop hypotheses about how the world works, or to test competing empirical models (Gates and Humes 1997). This case study differs from these orientations, as it primarily utilizes game theory as a guidance for gaining a better understanding of an empirical event. However, as stated above, the findings from this thesis will be applicable to other units of analysis, given that the caveats posed in the analysis hold.

A game, according to Gates and Humes (1997: 1) “involves situations in which individuals are aware that their actions affect one another.” Game theory is thus utilized to study the strategic interaction between actors. Munck defines game theory along the same lines, as “the branch of RCT that studies interdependent decision making with a formal methodology” (Munck 2001: 173). It is especially the ability to potentially perform rigorous and precise empirical analysis that is appealing with game theoretical analysis (Gates and Humes 1997).

Technically, a game is built on three parts – the actors, their strategies and the payoffs each player attaches to any combination of the players’ strategies (Luce and Raiffa 1989). The *actors* or *players* in a game are the ones who make decisions. In addition to the actors, *nature* can be introduced as a non-player at any stage in a game, making chance moves (Hovi 1998). *Strategies* are plans that prescribe the action for any situation in which the player can make a decision. Strategy has the same meaning as action in a game (Hovi 1998). The *payoffs* are attached to the different outcomes, and can be presented as ordinal- or interval scale rankings – the former will be applied in this thesis. In addition to the technical parts of the game pointed out by Luce and Raiffa (1989), the *rules of the game* include a specification of the sequence of moves and what information is available to each player when each decision is made (Hovi 1998, Gates and Humes 1997). The more technical game theoretical aspects will be dealt with when required in the analysis.

5.3 Data

This thesis relies heavily on secondary sources for its empirical account, more specifically qualitative document analysis of newspapers (both online and printed editions), press releases, speeches, reports, public hearings and books. Speeches and press releases have been collected directly from the web pages of the Federal Reserve, the Treasury and Lehman Brother's home pages. Material from hearings that have been conducted after Lehman Brother's demise has been gathered from their preliminary transcripts from the US House of Representatives³. These transcripts have been checked against actual video recordings of the hearings in order to confirm their accuracy. Commentary and analysis has been gathered from news sources like the New York Times, Bloomberg.com, BBC news, Reuters, CNN Money, Financial Times and the Wall Street Journal. When referring to news articles, the journalists' names have been used in the references in order to better distinguish between references from various issues of the same news source. Transcripts from interviews have also been used where available. Below I discuss the implications of using secondary sources for academic work.

By definition, secondary sources have indirect knowledge, meaning that they rely on primary sources or other secondary sources for information (Rozakis 2007). Newspapers and books are secondary sources that can constitute very useful research devices, insomuch as the researcher is critical with regard to whether the author's account is coloured by her own view or agenda (Grønmo 2004). In addition, newspapers and books are much more readily available than for instance potential interview objects, and are invaluable in the study of recent events that have not yet reached historical records. Crucial when relying on secondary sources for academic work is to be critical of the sources' reliability (Bechhofer and Paterson 2000). The fact that this thesis deals with a relatively recent event demands even more from the researcher in terms of assessing the reliability of the sources, since uninformed views may be prematurely released from otherwise reliable sources. When determining a source's reliability two points in particular must be addressed: quality and bias.

³ Preliminary transcripts have been used as sources, as final versions are not as of yet available.

The first issue with regard to quality is to ensure that the writer knows what he is talking about (Rozakis 2007). When using renowned newspapers like the New York Times as a source, one assumes that the journalists have insight into what they are writing about, however this may not always be the case. How well the author documents his claims is a crucial element in assessing the quality of a source.

One special trait of this study has been that many of the sources referred to in books and newspapers are anonymous due to the sensitive nature of the topics. This means that the author does not provide any way to identify the primary source, except claim that the source was “familiar with the process”, “close to Mr. X”, “present at the meeting” etc. These sources are often also exclusively cited by one specific author or journalist, in all likelihood because their integrity is dependent on them protecting their sources. In these situations, a researcher has to be very critical of the journalist or author’s credibility and record. Is there anything known about the author that would give him an incentive to portray the story in a particular manner⁴? What is the writer’s reputation? Does the essence of the story match other accounts of the events, or are there discrepancies?

With regard to bias, “Every source is biased, because every source has a point of view” (Rozakis 2007: 76). However, bias is not necessarily a bad thing as long as it is taken into account when evaluating a source. Journalists and novelists may for instance have an incentive to put a quote in a context where it does not belong or in support of something that would not be acknowledged by the person quoted if it fits the agenda of the author. Thus it becomes crucially important to cross-check, do background checks and be critical what the author may have to gain from saying what she says. Being aware of these potential pitfalls when relying on secondary sources makes the reliability of the research output all the better.

Summing up this chapter, this thesis is a case study that utilizes game theory as a tool in presenting a stylized version of the interaction between Lehman Brothers and the

⁴ If a commentator has any connection, personal or professional, to the subject of the story there is reason to be particularly suspicious. For instance when considering “insider stories” like that of Lawrence G. McDonald and Patrick Robinson’s book *A Colossal Failure of Common Sense: The Inside Story of the Collapse of Lehman Brothers* one has to take into consideration the authors’ incentives to portray the stories in a particular manner (protecting former colleagues who are personal friends, portray enemies in a bad light etc.).

government. The primary goal is to be able to better understand the outcome that was observed. The empirical material has in large part been collected through qualitative assessment of secondary sources. In the following chapter I will put the methods and critical assessment of sources to use.

6 Analysis

In this chapter I will attempt to demonstrate how Lehman's actions are contingent on how they perceive the government's preferences and capabilities. I will start with presenting the players of the game, the strategies available to them, and the sequence in which the game is played. This analysis will be based on a stylized presentation of the events that occurred around Lehman's bankruptcy.

Secondly, the stylized game will present the payoffs that the players attribute to the different outcomes as *ordinal values*, meaning that I will state that player X values outcome Y over outcome Z, but not by *how much* player X values outcome Y over Z. By presenting a stylized version of the interaction between the government and Lehman Brothers I make explicit the principal strategies that were available to the players, and present how the players would choose between these strategies after estimating the payoffs attributed to the different outcomes.

6.1 The game

The event we are studying is a sequential game between two players. The period of analysis starts right after Bear Stearns has been bailed out by the government on the 17th of March 2008, and ends with Lehman filing for bankruptcy the morning of the 15th of September 2008. The second cut-off point is obvious, while the first requires explanation: The focus on Lehman from commentators and agents in the financial markets increased dramatically after Bear Stearns' bailout, primarily because Lehman was perceived to be similar to Bear Stearns and potentially next in line to run into trouble. In addition, the bailout of Bear Stearns was a crucial event with regard to Lehman's strategic reasoning throughout the stylized game that is presented in this analysis.

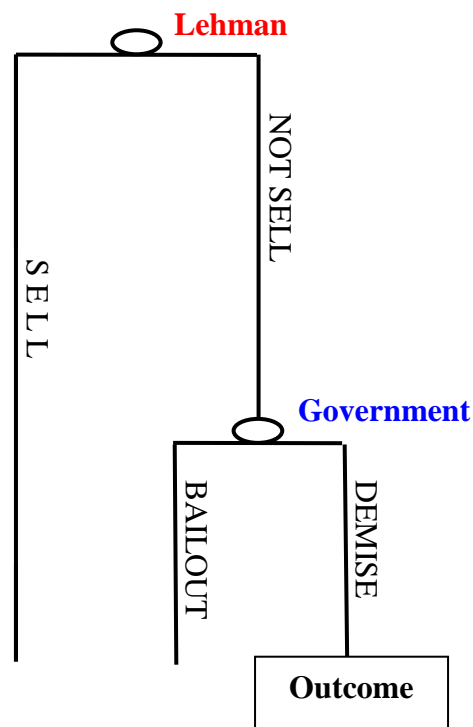
6.1.1 Actors

For Lehman Brothers, chief executive officer Dick Fuld was the one making the ultimate decisions as to what direction should be taken and what strategies were sought during the period in question. Fuld did of course have the rest of the Lehman management and his board of directors to weigh in on the decisions, but ultimately, he was the one who made the calls.

Although other individuals and groups clearly were involved in the process, Bernanke and Paulson were no doubt the two with the most weight from the government's side when it came to deciding the fate of Lehman Brothers.

One can argue that the preferences of Ben Bernanke and Henry Paulson should not be portrayed as unison, since the two may have had diverging preferences. From the material I have studied for this thesis, the two have not, however, openly displayed differences in opinion regarding policy, nor implementation of policy during the period in question; hence I treat them as acting in unison. Before explaining the strategies available for the players, let us for the sake of convenience have a look at what the extensive form of the stylized game I will base my analysis on looks like:

Figure 3: The game structure



6.1.2 Strategies and outcomes

In the stylized game, Fuld gets to act first, and can choose whether or not to sell Lehman Brothers. If Lehman chooses the strategy SELL, the outcome will be a sale of the company or parts of it, which means that Lehman's business will most likely be furthered, but under or together with another company. If Lehman chooses the strategy NOT SELL, the government can respond by playing strategy DEMISE or BAILOUT, signifying Lehman bankruptcy and Lehman bailout, respectively. In the stylized game I have excluded the potential outcome where Lehman does not sell, but still survives without government intervention, although there is a real possibility that Lehman will be able to survive as an independent company. Including this outcome in

the game would mean that we would have to allow Nature to move after Lehman plays strategy NOT SELL to decide whether Lehman will survive or not. This would make the game unnecessarily complicated, as Lehman's perception of this factor is captured in Lehman's payoff for "continued operation", as will be explained below.

The game has three potential outcomes – Sale which consists of strategy sequence {SELL, -}, meaning that Lehman or parts of it is sold in the market, breaching Lehman's independence; Demise {NOT SELL, DEMISE} which means that Lehman files for bankruptcy; or Bailout {NOT SELL, BAILOUT} which means that the government provides financial assistance in order to facilitate Lehman's survival.

We know that the outcome of this game was in fact, as shown in Figure 2, Demise. Before analyzing how this outcome was arrived at, we need to establish that the alternative outcomes that I present in this game were in fact real possibilities, meaning that the players indeed had the opportunity to act differently if they preferred.

Table 1: Potential outcomes

Strategy sequence	Outcome
{SELL, }	Sale
{NOT SELL, DEMISE}	Demise
{NOT SELL, BAILOUT}	Bailout

6.2 Examining the counterfactual

For this to be a meaningful analysis, we first have to establish whether Lehman indeed had the opportunity to find a market solution if they preferred this over a bailout or bankruptcy and second, whether the government did indeed have the power to rescue Lehman if they preferred a bailout over bankruptcy. Since neither of these assessments is uncontroversial or readily arrived at, we need to take some time to investigate the possibility of the counterfactual. What we need to establish is the following: Was Lehman free to choose strategy SELL if they had preferred the

outcome Sale? And, could the government have chosen strategy BAILOUT as a response to strategy NOT SELL if they had preferred Bailout to be the outcome?

6.2.1 Could Lehman Brothers have found a solution?

There is much debate as to whether or not Mr. Fuld and his colleagues in the Lehman Brothers management did in fact do all in their power to rescue Lehman from getting to the point where the only two remaining options were bankruptcy or financial assistance from the government to facilitate a merger. Since we know with the benefit of hindsight that the outcome was bankruptcy, if Lehman *did* indeed try every possibility to save the company and still ultimately failed, there are no grounds for claiming that Lehman could have found a solution even if they wanted to.

In Fuld's own words before the House of Representatives in the hearing of October 6th: "As the environment changed, we took numerous actions to reduce our risk. We strengthened our balance sheet, reduced leverage, improved liquidity, closed our mortgage origination businesses and reduced our exposure to troubled assets. We also raised over \$10 billion in new capital. We explored converting to a bank holding company. We looked at a wide range of strategic alternatives, including spinning off our commercial real estate assets to our shareholders. We also considered selling part or all of the company. We approached many potential investors, but in a market paralyzed by a crisis in confidence none of these discussions came to fruition. Indeed, contrary to what you may have read, I never turned down an offer to buy Lehman Brothers" (Committee on Oversight and Government Reform 2008). This latter statement clearly runs counter to what other commentators, including Lehman officials, have allegedly uttered.

To recap and expand on the introductory chapter of this thesis, Mr. Fuld had been searching for investors to buy a 5 to 10 per cent share of the company in the market since 2006: He was in contact with the Chinese company Citic Group, Kuwait's sovereign wealth fund and Martin J. Sullivan, the then chief executive of the insurance giant AIG, in the latter case allegedly looking to sell the entire company (Plummer 2008, Onaran and Helyar 2008, Sorkin 2008a).

In July 2008 talks were initiated with Bank of America. Fuld contacted General Electric's CEO Jeffrey R. Immelt, and made an overture to HSBC Holding Plc based in London, none of which resulted in a sale (Onaran and Helyar 2008). Mid 2008 Fuld was also in contact with the Korean Development Bank (KDB) which was, according to Fuld in his testimony before the US House of Representatives, only one of five banks in consortium wanting to buy up a 50 per cent share of Lehman in the market. The conversations had allegedly been going on for months. When asked in the hearing if this was the kind of arrangement Fuld was looking for at the time, he answered "I would have welcomed that transaction, yes, sir" (Committee on Oversight and Government Reform 2008). However, Fuld also stated in his testimony before the House of Representatives that it was not so much him actively engaging in selling parts of the company; it was rather a matter of the KDB seeking to buy a share of Lehman. This was in early August, one and a half months before Lehman filed for bankruptcy. Fuld allegedly refused the offer, never presenting it to the board of directors at Lehman (McDonald and Robinson 2009).

Sources close to Fuld have allegedly claimed that Fuld did not act in accordance with the severity of the situation when it came to finding a buyer for Lehman Brothers (Fishman 2008, Anderson and White 2008). "Dick was so proud of Lehman that he was slow to recognize that others didn't share that belief" (George L. Ball, friend of Fuld, cited in Onaran and Helyar 2008). Chairman Waxman in the Congressional Hearing where Fuld testified stated in his introductory remarks that "One internal analysis reveals that Lehman saw warning signs, but did not move early/fast enough, and lacked discipline about capital allocation" (Committee on Oversight and Government Reform 2008). Furthering this notion, Bank of America, when negotiating for a deal to take over Lehman Brothers, allegedly reported after having gone through its books that Lehman was carrying assets worth \$25 billion *less* than what Lehman claimed they were worth (Wessel 2009).

Paulson on his side allegedly uttered that he found Fuld to be unrealistically optimistic in how he tried to find a solution for Lehman (Wessel 2009). He also complained in interviews with the New York Times and Charlie Rose after Lehman's bankruptcy filing that he had been urging Mr. Fuld to find a buyer for Lehman. According to Brookly McLaughlin, a Treasury spokeswoman, Paulson "spoke to Fuld quite often"

between April and September, talks which according to Fuld were allegedly about Paulson encouraging him to find a strategic buyer for Lehman (Onaran and Helyar 2008). Further underscoring the point, Nocera and Andrews wrote in the Herald Tribune that Paulson was frustrated with what he perceived as Fuld's foot-dragging (2008b), referring to his lack of urgency to find a buyer for the company.

As we have seen, Fuld was busy approaching potential buyers for Lehman Brothers. However, no deal was sealed, and some regarded the absence of a solution as resulting from a lack of urgency and willingness to sell from Fuld's side. The evidence indicates that Fuld could have found a solution for Lehman in the market if he wanted to. Is there a motive for such behaviour from Fuld?

I have argued that Fuld did *not* try his best to sell Lehman Brothers, meaning that Fuld could have sold if he wanted to, but *chose not to*. This strategy could potentially have two different explanations, each producing roughly the same outcome:

The first potential explanation is that he had an inappropriate perception of how much his company was worth, and was demanding too much for it. A second potential explanation to why there was no sale is that Fuld believed the Government would come to the rescue as they had done with Bear Stearns if Lehman were to find itself in a position of imminent collapse, and that the possibility of such assistance made it more attractive for Lehman Brothers not to sell than to sell. If Fuld believed that bankruptcy was not his worst case scenario, but rather a government bailout, this would provide him with an incentive not to sell.

6.2.2 Could the government have bailed out Lehman Brothers?

Another central prerequisite for the analysis in this thesis to have merit, is that the government did indeed have room to manoeuvre, meaning that they did in fact possess the powers and the means to provide Lehman Brothers with financial assistance to facilitate a merger or otherwise contribute financially to their survival. If the answer to this question is no, the government then had no option but to let Lehman Brothers go under, rendering my analysis unwarranted.

As seen previously in this thesis, the Federal Reserve augmented the alternatives available for the central bank unprecedentedly with the marriage of Section 13 (3) and the SPV conducted when Bear Stearns was bailed out. With the new practice the Fed could inject liquidity in individual non-depository institutions⁵.

There is no doubt government could come up with large sums of money quickly; this was shown both with Bear Stearns and Fannie and Freddie before, and with AIG immediately after the weekend in September that sealed Lehman's fate. The main argument from both Bernanke and Paulson as to why they did not commit government money to facilitate a Lehman takeover by another financial institution is that the law did not permit them to do so – the Fed could only lend to non-bank financial institutions against good enough assets to serve as collateral. This can, however, be viewed as a way of doctoring the story post facto. As one commentator who was involved with both the Bear Stearns rescue and the Lehman Brothers failure stated, “They could have found a way to save Lehman” (Fishman 2008).

The focus on the impaired collateral as the main obstacle to committing money is seriously contested: for instance bankers involved with Lehman, according to Nocera and Andrews in their article in the New York Times “Struggling to Keep Up as the Crisis Raced on” (2008a), claim that they “do not recall Mr. Paulson talking about Lehman's impaired collateral” when officials from the Federal reserve inspected Lehman's books before the bankruptcy.

Paulson further said in the White House press room Monday morning after Lehman had declared bankruptcy that “I never once considered it appropriate to put taxpayer money on the line...in resolving Lehman Brothers” (Wessel 2009: 23), a statement signalling reluctance more than inability. Bernanke likewise stated before the US Senate that “In the case of Lehman Brothers, a major investment bank, the Federal Reserve and the Treasury declined to commit public funds to support the institution. The failure of Lehman posed risks. But the troubles at Lehman had been well known for some time, and investors clearly recognized...that the failure of the firm was a significant possibility. Thus, we judged that investors and counterparties

⁵ SPVs were later established to take toxic assets off AIG's balance sheet in a manner much similar to how this was executed with Bear Stearns (Baxter 2009)

had had time to take precautionary measures” (Bernanke 2008a). This statement bears witness of the same notion of unwillingness, not inability. To conclude regarding the capability of the Fed, the Federal Reserve could have set up an SPV in the same manner as they did with Bear Stearns in order to backstop a merger between Lehman Brothers and one of its potential buyers within the limits of their authorities and given their previous actions during the crisis. The other measures outlined previously in this thesis could also have been applied somewhere between Stage 1 and Stage 2 of the game we are analyzing here, as will be discussed in further length later. There is little doubt Paulson in particular was very reluctant to put tax-payer dollars on the line to rescue Lehman, but the evidence shows that not bailing out Lehman Brothers was more likely a matter of unwillingness than a lack of capability.

6.3 Solving the stylized game

Having established that all strategies in the game were in fact open to the players and all outcomes possible had the players preferred and been able to converge, we can proceed to the analysis of the player’s preferences and their interaction. Determining what strategies the players will choose in any given situation is the payoff attributed to the outcome each player believes the chosen strategy will yield. Building on chapters 3 and 4 in this thesis, let us first have a look at what factors are likely to have been taken into the equation by Lehman and the government when estimating their payoffs. In the spirit of backward induction, I will start with the last player to act, namely the government.

6.3.1 The government’s payoffs

In the game, the government has to decide whether it believes that the cost of bailing out Lehman Brothers exceeds the benefit Lehman produces for the well-functioning of the financial system and macroeconomic stability – Lehman’s systemic importance (si), meaning what damage would be inflicted on the US financial system in the event of a Lehman failure. When determining the cost of bailing out Lehman Brothers, the government has to evaluate the economical cost of the bailout (ec), the political cost of the bailout (pc) and the moral hazard inflicted on the system by a bailout (mh).

These three factors constitute the cost of bailing out Lehman in the stylized game presented here. Table 2 summarizes the elements that make up the payoffs.

Table 2: Explanation of the elements constituting the government's payoffs

Explanation	Element
Lehman's systemic importance	si
Economical cost of bailout	ec
Political cost of bailout	pc
Moral hazard inflicted on financial system from bailout	mh

The government's payoff associated with the outcome Demise, meaning that Lehman as player one and the first player to act chooses strategy NOT SELL and the government responds by playing strategy DEMISE, is $[-si]$ since the government does not suffer the costs associated with a bailout, but loses the value Lehman poses for the well-being of the financial system. The payoff attributed to outcome Sale which ends the game without the government responding to Lehman's action, gives the government payoff (0) since it keeps Lehman's business afloat without any costs for the government, preserving status quo for the financial system. The payoff attributed to the outcome Bailout is $0 - (ec + pc + mh)$, meaning that the government keeps the value Lehman poses for the financial system and macroeconomic stability (it does not suffer $[-si]$) minus the economic and political costs as well as the moral hazard that come with a bailout. These payoffs will be summarized in Table 4 together with Lehman's payoffs.

6.3.2 Lehman's payoffs

I argue that Lehman's sole concern in the game is to achieve the highest possible price for the company if it cannot proceed as an independent concern. Of course there are other considerations that would play into Fuld's decision on whether or not to sell; I still argue that these are subordinate to the price Fuld can achieve for himself and the

shareholders. As mentioned, the expected value of Lehman continuing as an independent concern is included in the payoff from the outcome Sale.

Payoff (pb) is Lehman's estimate of the price it will obtain for its shares in a Bailout. Payoff (ps) is the price Lehman believe it will get if the company is sold in the market, and (co) is the expected value Lehman attribute to the continued operation of the company, hence the payoff from outcome Sale becomes $(ps - co)$. If the outcome is Demise, this gives Lehman payoff (d).

Table 3: Explanation of the elements constituting Lehman's payoffs

Explanation	Element
Benefit from bailout	pb
Benefit from sale	ps
Expected value of continued operation	co
Benefit from bankruptcy	d

Lehman is as stated player one in the game, meaning that they get to act first. If Lehman believes that the government will choose strategy BAILOUT if Lehman chooses strategy NOT SELL, Lehman will play strategy NOT SELL if they perceive payoff (pb) to be greater than payoff $(ps - co)$. If Lehman believes that the government will choose strategy DEMISE if Lehman plays strategy NOT SELL, or if Lehman estimates that (pb) is smaller than $(ps - co)$, Lehman will choose to play strategy SELL. This way Lehman's choice of strategy is contingent upon its perception of how the government will respond to its actions, and how they assess the value of a bailout (pb) compared to the price they can obtain for Lehman in the market minus the value of continued operations $(ps - co)$. In Table 4 I present the payoffs attributed to the different outcomes by both players.

Table 4: The actors' payoffs

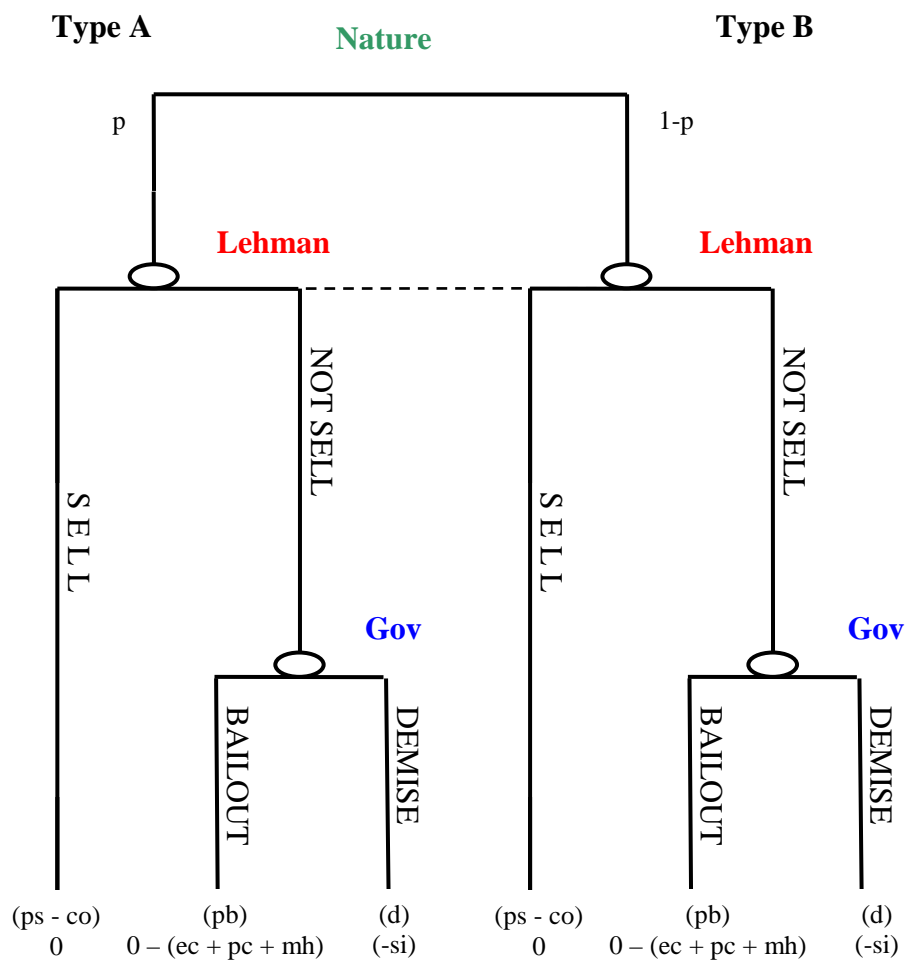
Outcome	Payoff Lehman	Payoff Government
Sale	$(ps - co)$	0
Bailout	(pb)	$0 - (ec + pc + mh)$
Demise	0	$(-si)$

6.3.3 Introducing Nature and incomplete information

As seen, the government abides to the policy of constructive ambiguity during the period of time we are analyzing. This means that the government does not give any clear signals to financial institutions as to whether or not they can expect the government to step in and rescue them should they face bankruptcy. The implication for Lehman Brothers is that it cannot know for certain whether the government will bail it out or not if they choose strategy NOT SELL and end up facing bankruptcy – the government cannot be expected to express whether it will prefer to bail Lehman out over letting it go bankrupt (TYPE A), or let it go under instead of bailing it out (TYPE B). Furthermore, even if such an announcement was made, the time inconsistency problem inherent through the discretion that comes with the policy of constructive ambiguity allows the government to eventually act counter to its announced preference when the time for decision comes. Lehman thus in practical as well as game theoretical terms has incomplete information to guide its decision of which strategy to play. The probability (p) in Figure 3 below denominates the probability Lehman attaches to the government being of TYPE A, while the probability ($p - 1$) is attached to the likelihood that the government is of TYPE B. The government on the other hand knows at all times which type they are.

Before presenting the arguments behind the ranking of preferences, let's have a look at what the stylized game looks like in extensive form with the payoffs and incomplete information introduced. The dotted line between Lehman's decision nodes signifies that when Lehman is to act, it does not know whether Nature has chosen the government to be of TYPE A or of TYPE B.

Figure 4: The stylized game with payoffs and incomplete information



Nature is a “non-player who makes chance moves at some stage in the game” (Hovi 1998). In the game that is played between the government and Lehman Brothers, nature first makes a chance move and decides whether the government is of TYPE A or of TYPE B. In accordance with the above, the government is TYPE A if it holds the following to be true, meaning that the government prefers Bailout over Demise:

$$si > (ec + pc + mh)$$

On the other hand, if the government is of TYPE B, it holds the following to be true and will prefer outcome Demise over outcome Bailout:

$$si < (ec + pc + mh)$$

The “random” decision is made by Nature in accordance with a probability distribution that can be estimated by the players (Rasmusen 2007). When we examine the players’ preferences below, we will see that Lehman’s decision regarding which strategy to play depends on its perception of which type of government it is facing, i.e. the value of p in Figure 3. The way for Lehman to deal with this uncertainty is to estimate the expected utility from playing each of its available strategies taking the fact that it may be facing wither one of the two types of government into account. Once Lehman determine the expected utility of both strategies, it can calculate which value p has to take for it to be more beneficial for Lehman to play strategy NOT SELL than strategy SELL, and vice versa. Before we can move to this point of the analysis, we need to establish what the players’ preferences are, meaning how the players rank the different outcomes in ordinal terms.

6.3.4 Ordinal ranking of preferences

The government

As we have seen above, the government's preference is determined by its assessment of Lehman's systemic importance weighed against the costs of bailing it out. With the benefit of hindsight, we know that the government was TYPE B⁶, since a TYPE A government would not choose strategy DEMISE as a response to Lehman's strategy NOT SELL. However, to be able to portray how the government looked from Lehman's point of view, we need to assess how the government was most likely to consider the proposed elements. Which values did the government attribute to them? One first step is to look at statements by Paulson and Bernanke. The explanation by the two following the demise of Lehman Brothers as to why they did not intervene has nothing to do with either of the elements I have put forward in this thesis as the basis for their decision. However, the statements do say something about their estimate of Lehman's systemic importance:

Paulson and Bernanke's stated reason as to why they did not rescue Lehman Brothers is that they did not have the powers to do so because of Lehman's impaired collateral (Nocera and Andrews 2008a, Thomas and Hirsh 2009, Bernanke 2008b, Wessel 2009). The exact words of Chairman Bernanke in an interview with 60 Minutes on the topic of Lehman's demise were: "There were many people who said, let 'em fail. You know, it is not a problem. The markets will take care of it. And I think I knew better than that. And Lehman proved that you cannot let a large internationally active firm fail in the middle of a financial crisis. Now was it a mistake? It wasn't a mistake for the following reason: we didn't have the option, we didn't have the tools. All the Federal Reserve can do is make loans against collateral" (transcript from CNBC 2009). The way Bernanke presents it in this interview, he leaves no doubt that he would prefer to rescue Lehman if he had had the powers.

Paulson uttered the same notion according to the New York Times, telling interviewers that if he had had the money before (referring to the \$700bn that was made available after TARP passed through Congress), he might have been able to

⁶ There are some reservations attached to the assumption that the government was TYPE B throughout the entire period studied here. This will be discussed in chapter 7.

save Lehman (Fishman 2008). These statements both convey the same message – Lehman was systemically important, and would have been rescued had the government possessed the powers to do so. I have already discussed the role of Lehman’s collateral, and concluded that they could have surpassed this obstacle if they had wanted to.

Paulson and Bernanke’s statements aside, what was the notion elsewhere about Lehman’s systemic importance? With the benefit of hindsight, Federal Reserve Bank of San Francisco President Janet Yellen stated in a speech in New York on the 16th of April 2009 that “Lehman was a systemically important institution” and that its bankruptcy caused the crisis to take a “quantum leap in terms of seriousness” (McKee and Chen 2009). She would not call the lack of government financial intervention a clear error, but she went far in insinuating that more should have been done in order to avoid a Lehman Brothers bankruptcy (McKee and Chen 2009). Christine Lagarde, France’s finance minister, did not stop at insinuating, calling the decision to let Lehman die “a genuine error” (Sorkin 2008c) right after Lehman’s bankruptcy was announced in September 2008.

Observing the disruptions in the financial markets after Lehman’s demise, there is no doubt that Lehman was in fact a systemically important financial institution. Estimations of how the government deemed the level of its systemic importance are difficult to assert, especially taking into consideration the government’s incentive to keep this a secret, as seen previously in this thesis. However, potentially subtracting from the government’s assessment of Lehman’s systemic importance was the outspoken notion on the part of Bernanke and Paulson that the markets had had time to prepare for a Lehman bankruptcy (Wessel 2009), hence leaving them better prepared to cope with Lehman going under than they would have been if Bear Stearns had been allowed to fail. Systemic importance is such a composite measure that I will not treat the time element individually, but include it in the estimate of (si). If the government really gave this aspect merit, Lehman’s systemic importance would be lowered as time passed, since the market would be constantly better prepared.

The economical cost of bailing out Lehman

Government lending of any kind to financial institutions is potentially costly due to the risk that the loan will never be repaid or that the collateral held against the loan loses its value and the institution becomes insolvent. The risk is difficult to avoid for the government – for instance the economic situation may deteriorate in the aftermath of an institution receiving assistance, meaning that although having been solvent at the time assistance was given, it may become insolvent after (Freixas, Giannini, Hoggarth and Soussa 2000). In the specific case of Lehman Brothers we have seen that unconfirmed sources claimed Bank of America wanted the government to guarantee for \$65 billion of Lehman's toxic assets. If this was the case and assistance was provided, the government could potentially lose the entire amount if the assets lost their value completely. On the other hand, the assets could increase in value, yielding a profit. As seen, the government drew much focus to Lehman's impaired collateral as a reason why no bailout could be effectuated. Poor collateral would increase the risk of the government suffering losses; however the focus on the impaired collateral is likely to have been exaggerated. The government was in any case likely to suffer economical losses from a bailout, the extent to which I will not go further in estimating beyond claiming that the losses could potentially become substantial.

Political cost for Paulson and Bernanke

With regard to the political cost, the pressure on Bernanke and Paulson for the Fed's activist role after the rescue of Bear Stearns had been immense (Wessel 2009). The political will for a bailout of Lehman was probably further decreased after Fannie and Freddy were bailed out just over a week before Lehman's bankruptcy. Even though the government considered Lehman systemically important (especially in the midst of a financial crisis where every financial institution of some size and interconnectedness would be considered of systemic importance), the political costs attributed to a bailout was likely to increase for every bailout that was undertaken. Wessel claims in his book *In Fed we Trust* (2009: 14) that Paulson stated in a conference call with Bernanke and Geithner that "I'm being called Mr. Bailout...I can't do it again" before the weekend Lehman filed for bankruptcy. This supports the view that the political cost of a bailout increases with the magnitude of bailouts that have been provided.

Moral Hazard

From the theoretical discussion of moral hazard we can expect that the level of moral hazard among financial institutions will also rise every time a new bailout occurs. As argued elsewhere in this thesis, it is especially the government's bailout of Bear Stearns that increases the incentive for Lehman to expect a bailout to be forthcoming during the period we are analyzing here. If the government had let Bear Stearns fail, Lehman would have had to estimate the possibility of a bailout to be lower than what was the case after having seen Bear bailed out. Hence, other financial institutions could be expected to reason in the same manner should the government bail out Lehman Brothers – moral hazard would undoubtedly rise.

Having explored Lehman's significance for the financial system and the costs that would follow a government bailout, we are far from able to present any rigid assessment of the margins that separate the government's preference ranking of the different outcomes. However, we can say something about the ordinal ranking of the outcomes.

The only outcome that does not incur any costs on the government is Sale, meaning that Sale is the government's most preferred outcome since both Bailout and Demise pose costs for the government. From the assessments above, we cannot assert with any kind of certainty which of these two latter outcomes the government preferred more during the period of this analysis. The reason for this is that even though sources claim that Paulson was encouraging Fuld to sell Lehman, this is compatible with what I have established above – Sale being the government's most preferred outcome. It does not say anything about the government's preference regarding the outcomes Demise and Sale. If one should assign weight to Paulson's statement that he never considered bailing out Lehman Brothers, one would have to conclude that Demise was the government's second most preferred outcome. However, Paulson contradicts himself when stating that he would have saved Lehman if he had the powers, which was also the statement from Bernanke. The fact that we only with the benefit of hindsight are able to establish how the government ranked their preferences proves that the policy of constructive ambiguity was a great success with regard to keeping financial institutions guessing.

The ranking of the preferred outcomes for the government was as in TYPE B as follows:

Sale > Demise > Bailout

Lehman

Since it is difficult to say anything meaningful as an observer about how Lehman estimated the relationship between the two payoffs, I will take Lehman's actions to be indicative of its preferences. This is in line with my previous argument in this thesis that Lehman could sell if it wanted to. Hence, the empirical observation that there was no sale I take to mean that Lehman estimated the payoff from a bailout to be higher than the payoff from a sale in the market minus the value of continued operation $[(pb) > (ps - co)]$ and played strategy NOT SELL. Furthermore, for Lehman to play this strategy, it must have estimated the likelihood of the government responding to strategy NOT SELL by playing strategy BAILOUT (i.e. the government being of TYPE A) to justify playing this strategy. This will be explained under *dealing with uncertainty* below.

While the outcome Demise gives Lehman a payoff of 0, both outcomes Bailout and Sale provide Lehman with a positive payoff, taking for granted that neither would provide Lehman with some kind of benefit as opposed to bankruptcy. From the empirical observation I derive that Lehman ranked the outcomes in the following preferred order:

Bailout > Sale > Demise

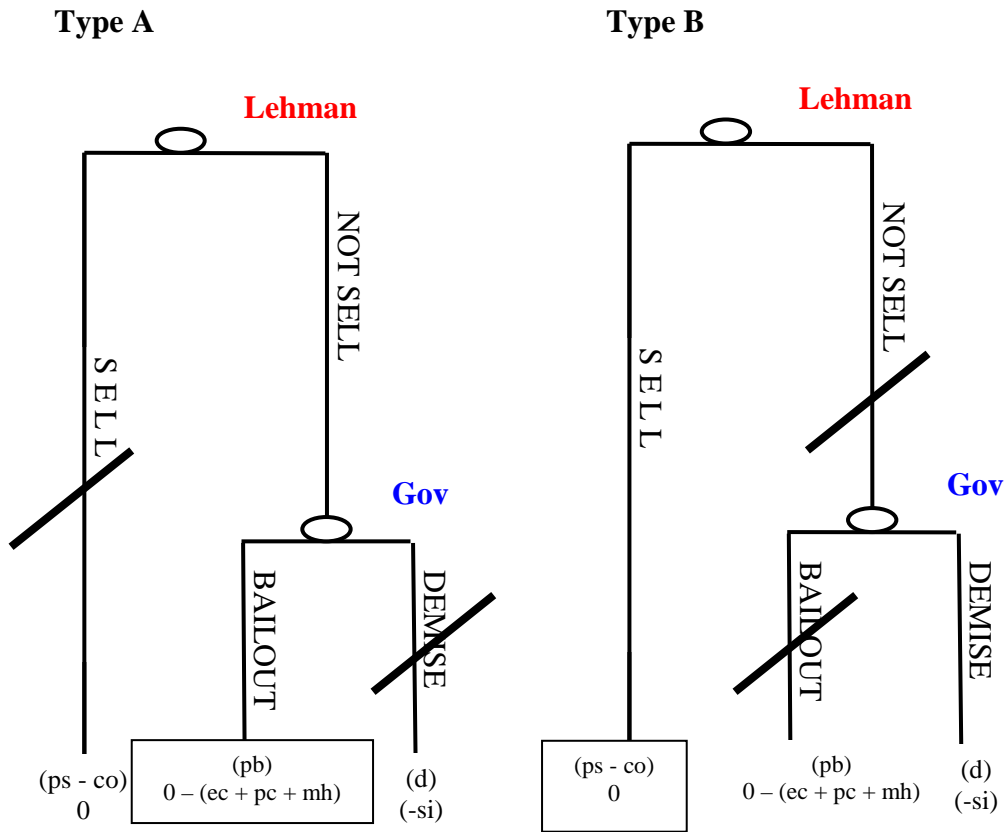
To achieve their highest payoff, Lehman has to play strategy NOT SELL. However both Demise and Bailout can be the outcome of Lehman playing this strategy. This means that Lehman has to estimate what they believe the government will do as a response to Lehman playing strategy NOT SELL. If Lehman plays strategy SELL the government does not act, and the outcome is immediately Sale. On the other hand, by playing strategy NOT SELL, the government decides the fate of Lehman. The way for Lehman to establish what strategy will provide the highest payoff under conditions of

incomplete information, is to take both potential outcomes of playing strategy NOT SELL into consideration, and determine the expected utility of playing this strategy compared to playing strategy SELL.

6.3.5 Pretending complete information

How would the game be solved if the players acted under complete information? By figuring this out we can determine what the equilibria would have been if Lehman knew that it was faced with a government TYPE A or B, meaning what would have been the optimal sequence of strategies for both players to achieve the highest common payoff. We remove uncertainty by taking Nature out of the game and allowing Lehman to know before moving whether the government is TYPE A or B. We solve a game of complete information by identifying the Nash equilibrium(s), a set of strategies from which none of the players have an incentive to unilaterally deviate. The way to solve this game through backward induction is by first determining what is the optimal choice of strategy for the last player to make a move in the game, and then we do the same for the next-to-last player, but with this player we take the selected action by the last player as given (Hovi 1998).

Figure 5: Solving the games with complete information



Under conditions of perfect information, in a world where the government was TYPE A, the Nash equilibrium would be {NOT SELL, BAILOUT}. In a world where the government was TYPE B, on the other hand, the Nash equilibrium would be {SELL, –}. These are hence the optimal outcomes corresponding to each type of government. In the real world, however, information was incomplete.

6.3.6 Dealing with uncertainty

The source of the insecurity for Lehman as to whether the government is TYPE A or B is as indicated previously the policy the government chose in dealing with the sub-prime crisis from the beginning. It is largely recognized that Ben Bernanke's predecessor as Fed Chairman, Alan Greenspan, outspokenly conducted a policy of constructive ambiguity (Harris 2008). When Ben Bernanke took over the position as Fed Chairman in February of 2006, there was perceived to be a shift toward transparency in the day-to-day operations (Felton 2008). However, during the current financial crisis, it is evident that the handling of the crisis from the government has been that of constructive ambiguity up until Lehman's demise. I base this on the fact that after Bear Stearns, there was no clear indication to the financial markets as to what would be the government's stance if an important financial institution were to find itself on the brink of bankruptcy. As Elliot Schwartz and Charley Johnson write on the website for the Committee for Economic Development (CED), "The failure of Lehman Brothers, which was in part an attempt to maintain 'ambiguity' about the government's commitment to large financial institutions, and the intolerable consequences proved to all that there would be 'no more Lehmans'" (2009).

We can also be certain that the government did not adhere to an explicit TBTF doctrine because they did not announce that the US financial system would be backstopped until after Lehman had filed for Chapter 11 and AIG was bailed out – in the period after Lehman's demise, the government adopted a policy very close to the TBTF doctrine (Schwartz and Johnson 2009). This means that, at least after-the-fact, it is possible to affirm that the government was indeed acting according to the policy of constructive ambiguity between mid March and mid September 2008.

Having bailed out Bear Stearns in March and Fannie Mae and Freddy Mac in the first week of September 2008, the government had in fact not let any major financial institution fail since the sub-prime crisis started when Lehman filed for bankruptcy. This implies that it seemed to rely heavily only on one of constructive ambiguity's potential outcomes, namely the bailout option. This was no doubt observed and appreciated by the financial market, and institutions could, based on this observation coupled with the fact that no officials made clear statements to the contrary, assume that the government was "bailout-heavy" in dealing with the crisis. This means that the government was running a policy of constructive ambiguity which from an observer's point of view could look like an inclination toward what we have labelled the TBTF doctrine. Under the understanding that financial institutions on Wall Street had reason to believe that the government was running a bailout-heavy version of constructive ambiguity at "worst", or adhering to the TBTF doctrine at "best", Lehman had reason to believe that the government might very well come to the rescue if things went very wrong.

In order to establish how Lehman should choose in our stylized game taking this uncertainty into consideration, we first need to assess how the government looks from Lehman's perspective. As stated, the government will always hold as its highest preference that Lehman choose strategy SELL, and this is also known to Lehman. With regard to the government's ranking of the two remaining outcomes, this will depend on the government's estimate of (si) compared to (ec + pc + mh), Lehman's systemic importance compared to the cost of a bailout, represented by two types of government. Below is how the two types appear to Lehman in terms of preference ranking:

Type A:

Sale > Bailout > Demise

Type B:

Sale > Demise > Bailout

In other words, if the government is of TYPE A, it will respond to Lehman playing strategy NOT SELL with strategy BAILOUT. If the government is of TYPE B, it will respond to Lehman playing strategy NOT SELL with strategy DEMISE.

Having established what the government will do as a response to Lehman's strategy NOT SELL across the two potential types, Lehman can discover the values of p for which the expected payoff of each available strategy exceeds that of the other (Gates and Humes 1997). On the left side of the following equation is the expected utility for Lehman to play strategy NOT SELL, and on the right, the expected utility from playing strategy SELL:

$$P(p_b) + (1 - p)(d) > p(ps - co) + (1 - p)(ps - co)$$

$$p(p_b) + d - p(d) > p(ps - co) + (ps - co) - p(ps - co)$$

$$p(p_b) + d - p(d) > (ps - co)$$

$$p(p_b) - p(d) > ps - co - d$$

$$p(p_b - d) > ps - co - d$$

$$p > \frac{ps - co - d}{p_b - d}$$

Knowing that the value of (d) is 0, we can reduce the inequality further to

$$p > \frac{ps - co}{p_b}$$

Accordingly, Lehman should play strategy NOT SELL if the inequality holds. Before proceeding to finding equilibria in this game, we need to establish that the expression

on the right side of the inequality can take on a value between 0 and 1, meaning that the numerator is positive and less than the denominator (Gates and Humes 1997). We know from the discussion above that $(ps - co)$ is positive, which satisfies the first requirement. The value of (pb) has also been stated to be positive. Furthermore, we have established that $(ps - co)$ is smaller than (pb) , which fulfils the second requirement, meaning that the right side of the inequality is a number between 0 and 1.

6.3.7 Establishing equilibriums

The equilibrium of the game depends on Lehman's assessment of the value of p and the real preferences of the government, i.e. what type it is. The equilibria can thus be stated as follows:

TYPE A:

{NOT SELL, BAILOUT} if $p > \frac{ps - co}{pb}$

{SELL, -} if $p < \frac{ps - co}{pb}$

TYPE B:

{NOT SELL, DEMISE} if $p > \frac{ps - co}{pb}$

{SELL, -} if $p < \frac{ps - co}{pb}$

We have here found an equilibrium that is the actual outcome of the interaction between Lehman Brothers and the government, namely the first equilibrium under TYPE B, {NOT SELL, DEMISE} – outcome Demise. Examining the equilibrium, Lehman would have reason to regret its action after the fact and want to change its strategy to SELL given the response of the government. This regret stems from the fact that after having observed the government's move, Lehman knows what type the government is as opposed to before the government's move, when Lehman only has p to estimate its type. As we will see below, this is exactly what happened, and after the government's move, Lehman was not able to change its strategy.

As we can see, the only way to reach this equilibrium is if Lehman believes that $p > (ps - co) / (pb)$. Breaking down this expression, p has to be higher than the payoff from a sale minus the expected value of continued operation divided by the payoff Lehman expects from a bailout in order for Lehman to prefer to play strategy NOT SELL. This means that the higher the value Lehman estimate payoff (pb) to take on relative to payoff ($ps - co$), the more Lehman will be inclined to playing strategy NOT SELL even if p is relatively low. It also means that even if Lehman only values (pb) slightly over ($ps - co$), it still has an incentive to play strategy NOT SELL if the value of p is perceived to be sufficiently high. To demonstrate this, I will provide two examples inserting numerical values for p , (pb) and ($ps - co$) in the equilibrium above:

Example 1: p is low, (pb) is high relative to ($ps - co$):

$$p > \frac{ps - co}{pb}$$

$$0.1 > \frac{25 - 24}{12}$$

$$0.1 > 0.083$$

Example 2: p is high, (pb) is only slightly higher than $(ps - co)$:

$$p > \frac{ps - co}{pb}$$

$$0.9 > \frac{2.75 - 1}{2}$$

$$0.9 > 0.88$$

In the first example, the likelihood of a bailout is small, but the benefit from a sale in the market is much smaller than the benefit from a bailout due to the high value of the expected return from continued operation. In this example the highest expected utility thus comes from playing strategy NOT SELL.

In the second example the benefit gained from a bailout is only marginally larger than that gained from a sale minus expected value from future operations. However, the likelihood of receiving a bailout is very high; hence the highest expected utility comes from playing strategy NOT SELL in this example as well. I will argue that the empirical case was more likely to resemble the extreme in example 2 than example 1.

We can establish that the real value of p depends on the government's estimate of Lehman's systemic importance minus the cost of bailing Lehman out. Keeping in mind that the real value of p would rise with the government's inclination to bailing Lehman out as opposed to letting Lehman fail, what value is there reason to believe that Fuld estimated p to be?

Fuld's estimate of p would first and foremost depend on his assessment of Lehman's systemic importance, and how he believed that the government estimated this. In order to present one take on Fuld's view of Lehman's systemic importance, I find it necessary to cite an entire section of Mr. Fuld's statement in the testimony before the House of Representatives on the 6th of October 2008, being questioned by Mr. Welch of the Democratic Party. First Mr. Welch summarized what had happened in the crisis,

and stressed that Lehman had been treated differently than the other financial institutions when it was about to fail. The questioning then went as follows:

“Mr. Welch: Did you have any concerns that there may be some arbitrary reasons why Lehman Brothers, facing similar predicaments as AIG, was allowed to fail, whereas AIG was the beneficiary of an \$85 billion bailout sponsored by the Treasury Department?

Mr. Fuld: Well, I clearly would have loved to have been part of the group that got that.

Mr. Welch: Well, do you have any views on that or thoughts on that, why you were allowed to fail, You, Lehman Brothers, were allowed to fail and AIG was bailed out?

Mr. Fuld: That was a decision that was made that Sunday afternoon.

Mr. Welch: I know that.

Mr. Fuld: And I was not there.

Mr. Welch: You have got to be wondering. You are the head of this company. You want to keep it going. I understand from you everybody knew you were dedicated to the survival of Lehman.

Mr. Fuld: Until the day they put me in the ground.

Mr. Welch: Exactly.

Mr. Fuld: I will wonder.

...

Mr. Welch: I will just ask you your opinion. Do you think that there was any justified reason why Lehman was treated one way; namely, allowed to fail, and AIG, just as another example, was given \$85 billion in taxpayer assistance to bail it out?

Mr. Fuld: I do not know why we were the only one.” (Committee on Oversight and Government Reform 2008)

This statement by Fuld clearly gives an impression that he did consider Lehman Brothers not to be any different from the institutions that received a government bailout, and that Lehman was thus of sufficient systemic importance to warrant a bailout.

Fuld’s statements aside, did Lehman have *reason to believe* that it was sufficiently important for the system to warrant a bailout, or are Fuld’s statements indicative of him trying to avoid some of the blame for Lehman failing? The bailout of Bear

Stearns is a crucial element here. As former chairman of the Federal Reserve Alan Greenspan said it in an interview, “[o]nce you put the line under Bear Stearns, that whole structure of financial and non-financial institutions above that automatically became too big to fail” (Torres and Harrington 2008). This signals support for Fuld’s uttered belief outlined above.

Furthermore, according to Brunnermeier et al (2009) in chapter 4 in this thesis, the fall of an individually systemic institution with highly leveraged positions and maturity mismatch on their balance sheets causes negative externalities for the rest of the system. The pro-cyclical liquidity spirals would have a higher probability of increasing momentum in a negative direction for the system as a whole were Lehman to fall. One important aspect here is that Fuld probably was in a better position to assess what would be the consequences of Lehman’s demise than the government was, even though the government had insight into Lehman’s books. This allows for the possibility that Lehman may have correctly perceived its systemic importance as higher than what the government appreciated, which in turn means that it is possible that the government would have chosen to bail Lehman out had they had Lehman’s knowledge of its systemic importance. Any effort to address this discrepancy in perception would most likely not be taken seriously, since Lehman had an incentive to exaggerate its systemic importance in order to increase the likelihood of a bailout (Rochet and Tirole 1996).

When looking at the factors Fuld most likely evaluated when estimating whether or not he believed a bailout could be expected, it is reasonable to assume that he considered the likelihood of a bailout fairly high if Lehman stood on the verge of bankruptcy. Both Fuld’s testimony and my assessment of the situation above indicates that Lehman believed, and had reason to believe, that the government was very likely to be of TYPE A. When the government bailed out Bear Stearns, they demonstrated that the possibility of a bailout existed, generating expectations among the remaining financial institutions similar to those discussed in the chapter on moral hazard in this thesis. In game theoretical terms, the strategy BAILOUT was added to the government’s options in the eyes of financial institutions, to the degree they did not believe that the government already possess this capability beforehand, bringing p and (pb) into Lehman’s strategic reasoning. Bear Stearns’ bailout is not likely to have

made Lehman believe that a bailout would be very generous, not even after the compensation for the shareholders of Bear Stearns was adjusted from \$2 to \$10. However, the compensation paid to the shareholders in the Bear Stearns bailout was significant compared to no bailout, and made Lehman estimate (pb) to be higher than (ps – co). I argue that (pb) was not perceived as substantially higher than (ps – co) by Lehman, hence p must have been perceived to be high, resembling example 2 above. I return to this in chapter 7.

6.3.8 The outcome

Lehman did not seal a deal with any of the potential buyers, and on the 12th of September it was made explicit to the public that the government did not intend to commit government money to rescue Lehman Brothers⁷. Two of Paulson's aides (his chief of staff Jim Wilkinson and spokeswoman Michele Davis) spread the word to the press that Paulson had vowed no taxpayer money would come to the aid of Lehman (Wessel 2009, Cho, Landy and Irwin 2008). The story hit the front page of the Washington Post as well as other media the same day (Cho et al. 2008). Fed officials were, according to Torres and Harrington (2008), taking a similar stand. This was the first time it was uttered in clear words from sources close to those who would in the end make the decision that no financial support would be given to rescue Lehman Brothers from bankruptcy.

At this point, Fuld probably regretted that he hadn't sold at an earlier stage. The problem was now that whether or not he could sell Lehman was no longer up to Fuld – there simply was no buyer. As Robert Peston of BBC News put it on the 14th of September (2008), “The stumbling block is that no bank or other financial institution wishes to take on Lehman's massive liabilities without some kind of protection or guarantees from the US government”. This means that the only way Lehman Brothers could be sold, was if it came with a government bailout. SELL was no longer an available strategy for Lehman, and their fate was in the government's hands.

⁷ There exists the theoretical possibility that this announcement was a bluff from the government. This could be modelled by allowing Lehman to change its strategy after the announcement. However, in our game the strategy SELL was not available for Lehman after the announcement; hence bluffing Lehman would have no merit.

As stated in the beginning of this thesis, Bank of America left talks and focused their attention on Merrill Lynch. When Barclays pulled out from talks, it was allegedly because they could not pull together a share holder vote to guarantee Lehman's liabilities come Monday morning. Once this became clear, there was in effect no buyer for Lehman that the government could backstop a merger for even if they wanted to, hence the bailout a-la Bear Stearns option was ruled out for the government. The remaining bailout options were then a direct loan to Lehman, capital injection, converting to a bank holding company, or spinning off Lehman's toxic assets in a separate unit which would be backstopped by the government. As observed, none of these measures were taken, and Lehman filed for chapter 11 early in the morning on the 15th of September. As to why the government did not implement any of these options, I will not go further than stating that the government must have deemed, perhaps mistakenly as indicated above, the cost of implementing the measures to exceed Lehman's systemic importance.

It is during the period between Bear Stearns' bailout and the statements from Hank Paulson's aides that no tax payer money would come to the rescue of Lehman that measures could have been taken to avoid the eventual outcome of Lehman defaulting. The good bank/bad bank measure and the option of turning Lehman into a bank holding company could have been undertaken during this period, as well as a capital injection. This is also the period in which Lehman could have sealed a deal with a buyer, all amounting to, in hindsight, six months of lost opportunities ending in a sub-optimal outcome.

7 Discussion and concluding remarks

Why did we end up with this outcome? I claim that the government's policy choice provided Fuld with incentives that eventually led to a sub-optimal outcome. Demise was Lehman's last and the government's second preferred outcome, and as seen when solving the games with complete information, the Nash equilibrium when the government was TYPE B was outcome Sale. In the discussion of why this outcome was the result, we can treat the goal of constructive ambiguity – to keep financial institutions uncertain as to whether and how they will be bailed out – as an implicit threat made by the government. Jon Hovi in his book *Games, threats and treaties: understanding commitments in international relations* (1998: 11) defines a threat as “a contingent assertion signalling an intention to hurt somebody – physically, economically or otherwise – unless that somebody acts in the way prescribed by the threatener”. The proscribed manner is for us here avoiding the situation where a government bailout would be required to keep Lehman alive, and the potential punishment for transgression is the absence of a bailout. In other words, by abiding to the policy of constructive ambiguity, the government threatens that it will not provide a bailout if financial institutions find themselves on the verge of bankruptcy.

7.1 Conditions for a threat to be successful

A threat can be deemed effective if it succeeds in making the target alter its behaviour in accordance with the threatener's desires (Hovi 1998: 13). In the interaction between Lehman Brothers and the government the threat/constructive ambiguity would be judged successful if Lehman Brothers had sold the company and avoided bankruptcy without the need for government intervention. Hovi lists five conditions that must be fulfilled in order for a threat to be judged effective:

Relevance

The first condition is that “[t]he threat must be *relevant*, in the sense that it can have an impact on the outcome” (Hovi 1998: 13-14, italics in original). This means that the threatened part must have room to manoeuvre, and that it must have an incentive to go against the threatener. I have established in the analysis that in all likelihood both of these were present: Lehman could have sold if they wanted to, and Lehman could have an incentive not to sell if it anticipated that the government would provide a

bailout, which I have established that it did. Constructive ambiguity could thus potentially lead Lehman to acting differently from what it would have if it could be certain that a bailout was forthcoming, i.e. if p was known to be 1.

Severity

Second, "... the threat must be sufficiently *severe* to make a difference to the target" (Hovi 1998: 14). Constructive ambiguity definitely could produce an outcome that would be very severe for Lehman, namely Demise. Demise was Lehman's least preferred outcome providing a payoff of 0, making the threat very severe for Lehman.

Credibility

The third condition is that "...to be effective, a threat needs to be credible" (Hovi 1998: 15). The credibility of a threat relates to the degree to which the target believes that the threatener will carry out the threat if the target's actions do not correspond with the threatener's wishes. A threat can be extremely severe, yet prove to be impotent if the target believes that it will not be put into effect (Hovi 1998: 15). This is the most important of the conditions for our purpose, I thus return to *credibility* after having presented the remaining conditions.

Completeness

"A fourth condition for a threat to be credible is that it is *complete*" (Hovi 1998: 15). A threat is complete if the target believes that if he does comply with the threatener's wishes, the threat will not be effectuated. In the analysis conducted in this thesis, this condition is met automatically since if Lehman Brothers manages to find a solution in the market a bailout will not take place. Hence, if Lehman complies with the threat, it becomes irrational to bail them out, thus the criteria of completeness is assumed to be met automatically.

Clearness

"...in order to be effective, a threat has to be sufficiently *clear*" (Hovi 1998: 16). This means that the message conveyed in the threat must be understood by the target, and it must get through to the target.

One fundamental trait of the policy option of constructive ambiguity is that it effectively eliminates the possibility of being clear. With the public announcement by Paulson's aides three days before Lehman declared bankruptcy, the threat was made explicit for the first time, which definitely contributed to making the until then implicit threat clearer. If the same had been uttered a couple of months earlier when Lehman was apparently still in relatively good shape, much less credibility would likely have been attributed to it. However, the timing of the statements made the commitment much more credible, since it was becoming increasingly apparent that Lehman was facing bankruptcy if no measures were taken. I will return to this below.

7.2 Assessing credibility

I will here discuss the credibility of the threat implicit in constructive ambiguity in the game between Lehman and the government, in light of the conditions above. I will argue that the threat not to provide a bailout was not credible, and discuss why I find this was the case. First of all, how does a lack of credibility for constructive ambiguity look in game theoretical terms for the game that has been analyzed in this thesis?

To reiterate, the Nash equilibrium under government TYPE B when we solved the games with *complete* information was {SELL, -} – outcome Sale. Under *incomplete* information the corresponding equilibrium (not the outcome, but the other potential outcome of government TYPE B) takes the following form:

$$\{\text{SELL}, -\} \text{ if } p < \frac{ps - co}{pb}$$

The equilibrium above represents the most preferred outcome for the government and the second highest preferred outcome for Lehman. To arrive at this outcome, Lehman has to estimate p to be lower than the value of a sale minus the expected value of continued operation divided by the value of a bailout. In the analysis I argued that Lehman did not have reason to value (pb) sufficiently higher than $(ps - co)$ to choose strategy NOT SELL with a relatively low estimate of p . Hence the reason why strategy NOT SELL was chosen by Lehman, I argued, was that Lehman believed p to be relatively high. This means that the government's threat lost credibility due to it not being able to influence Lehman's perception of p in a way that could lead Lehman

to adjust its estimate sufficiently downward for it to choose strategy SELL. Why did Lehman hold such a high estimate of p ?

As discussed previously, the aim of constructive ambiguity is to portray the government in as bailout-averse a manner as possible while allowing it to retain the discretion to provide a bailout if it deems macroeconomic stability to be at risk. Having bailed out Bear Stearns in March, the government had let the genie out of the bottle (Goodhart cited by Hilsenrath et al. 2009) and put a line under financial institutions bigger than Bear Stearns, providing them with reason to believe they would be rescued (Torres and Harrington 2008). At the time of bailing out Fannie Mae and Freddy Mac in the first week of September 2008, the government had in fact not let any major financial institution fail since the sub-prime crisis erupted. This indicates that the government relied heavily on only one of constructive ambiguity's potential outcomes, namely bailout. This was no doubt observed and appreciated by financial institutions, who could reasonably suppose the government to be taking a "bailout-heavy" approach in dealing with the crisis. The implication is that the government was running a policy of constructive ambiguity which from an observer and Wall Street's point of view could look like an inclination toward what we have labelled the TBTF doctrine. With the justifiable understanding that the government was running a bailout-heavy version of constructive ambiguity at "worst", and adhering to the TBTF doctrine at "best", Lehman had good reason to believe that p was relatively high right after Bear Stearns was bailed out. After this, Lehman's estimate of p can be expected to have risen as time passed and no significant financial institutions went belly up – and especially after Fannie and Freddy were bailed out.

On the 10th of July 2008, between the rescues of Bear and Fannie/Freddy, Paulson held a speech on regulatory reform before the House Committee on Financial Services. Here, he stated that for market discipline to be effective, market participants cannot expect that government assistance will be readily available. He continued "For market discipline to effectively constrain risk, financial institutions must be allowed to fail..." (Paulson 2008). Even this statement is not likely to have done much in order to adjust Lehman's estimate of p downwards, I argue. The reason for this is that it is not costly for the government to make such a general announcement in public; it may benefit from it if financial institutions perceive the statement as an indication that the

government will not come to their rescue. On the other hand, if the government goes ahead and bails out a financial institution after having made such an announcement, the effect of the actual bailout in terms of moral hazard will be a far greater concern for the government than the credibility it will have lost for acting counter to a general statement like the one made by Paulson in July. Lehman and other Wall Street firms were, however, unlikely to have been frightened by this statement by Paulson: The government's "actions [had] spoken louder than words" (Goodhart cited by Hilsenrath et al. 2009).

With regard to the assessment of systemic importance, as stated in the analysis, there is also a strong possibility that Lehman may have had a higher assessment of its systemic importance than what the government had. If this was the case, it would be a contributing factor to Lehman estimating p to be sufficiently high to warrant playing strategy NOT SELL. In other words, Lehman may have deemed itself of higher systemic importance than what the government did. This explanation opens up the possibility that the government made a mistake in letting Lehman go, and that they would have acted differently had they shared Lehman's estimate of (si) . Whether a mistake was made is still a hot topic for debate one year after Lehman's bankruptcy.

7.3 The aftermath of Lehman's bankruptcy

Does the period after Lehman's demise provide any indication as to how the government evaluated the outcome of its handling of the crisis thus far? The events following Lehman Brothers' bankruptcy filing indicate that this marked a turning point in the government's approach: The day after Lehman collapsed the Fed saved American International Group (AIG) with an emergency loan of \$85 billion. This, however, did not prevent credit markets all over the world from freezing up: Reserve Primary Fund, a money market fund that held Lehman bonds, became the first money fund in 14 years to "break the buck," the term for falling below the \$1 a share (McKee and Chen 2009, Nocera 2009). At this point, according to the New York Times (2009b), Mr. Paulson decided to take a more systemic approach and stop dealing with the crisis one case at a time. Paulson and Bernanke approaching Congress marked the conception of the \$700 billion Troubled Asset Relief Program (TARP) that was eventually passed after two rounds in Congress. The final version was passed in

Congress and the Senate, and signed into law by President Bush on the 3rd of October 2008 (New York Times 2009b). It was soon made clear that the 14th of September 2008 would be the last time the government said “No” to helping a significant financial institution in distress (Wessel 2009).

7.4 Addressing the problem

Having provided an account for how the interaction between Lehman and the government resulted in a sub-optimal outcome begs the question: What could have been done differently? What could the government have done to increase the likelihood of arriving at the Nash equilibrium from the game with complete information? Four measures are theoretically possible: Provide reason to adjust the estimate of p downwards, the estimate of (pb) downwards, the estimate of (ps) upwards or the estimate of (co) downwards. The two latter are beyond the scope of this thesis, and will not be discussed. The former two, however, are under the government's influence.

If the government could succeed in removing its own strategy BAILOUT and Lehman's corresponding payoff (pb) from the game entirely, Lehman would always choose strategy SELL, since DEMISE would be the certain outcome from playing strategy NOT SELL: The government would always be TYPE A. How this could be achieved is beyond the scope of my analysis, thus I choose to be agnostic as to how this could be achieved in practical terms.

Alternatively, if the government cannot eliminate the BAILOUT option, or it does not wish to, it can do everything in its power to make bailouts as painful as possible for the bailed out party by making sure the value of (pb) is as small as possible. Then the question becomes if it is possible to rescue a financial institution and punish its management and shareholders sufficiently not to spur moral hazard at the same time. This is also beyond the scope of this analysis.

The other way to address the problem would be to ensure that financial institutions' perception of p would be low. The only way to conceivably achieve this is, as we have seen, not to bail out financial institutions. In chapter 3 I wrote that the concern

about spill-over is easily converted to protection of uninsured creditors for policymakers, which implies that if a government is granted discretion in dealing with financial crises, it is very tempting to convert discretion coupled with fear of spill-overs to bailout.

This means that for constructive ambiguity to be a viable policy to obtain its goal of preventing moral hazard, the government has to install some mechanism that limits its discretion with regard to which institutions are bailed out. Hovi (1998: 42 - 44) proscribes, as one of several measures to make a threat more credible, to leave something up to chance. This implies that the threatener would not be in full control of what the result would be if the target did not comply with the threat. The literature distinguishes between threats of deterrence and threats of compellence (Hovi 1998), where the latter is of interest for us here. Threats of compellence threaten that “if transgression occurs, then the threatener will take action which sets in motion a random mechanism” which may or may not bring about consequences that are perceived by the target as punishment.

The point to be made is that the threatener, after having activated the random mechanism, does not control the outcome of the mechanism’s “decision”. For instance, the government could flip a coin and call that heads would signify bailout, tails bankruptcy. Such a measure would make constructive ambiguity a truly mixed strategy for dealing with financial institutions in distress, meaning that there would be a 50-50 chance for a bailout. This would make the threat more credible, while at the same time opening up the possibility that an institution that was indeed individually systemic would be allowed to fail, with the repercussions this would imply for the financial system and the economy. Chapter 3 demonstrates that financial institutions may go under even if their business is fundamentally sound under certain circumstances, meaning that even if such a policy was successful as a deterrent, the system could still experience a systemic crisis as a consequence if an individually systemic financial institution stood on the verge of bankruptcy and the government’s coin showed tails.

7.5 Conclusion

This thesis sought to examine what caused the Lehman Brothers bankruptcy through analyzing two interrelated puzzles, namely why Lehman did not find a market solution in time, and secondly why the government did not provide a bailout to Lehman Brothers to avoid the bankruptcy of a systemically important financial institution. My approach has been first to gain an understanding of what happens when the financial system experiences liquidity shortage coupled with financial institutions of systemic significance having taken on excessive risk and relied heavily on leverage with maturity mismatch on their balance sheets. Secondly, I have attempted to identify the theoretical rationale likely to be underlying government decisions in a situation such as the one described, what the options available for the government are, and what may guide its decision.

In the analysis I have constructed a stylized game where I have sought to capture the interaction between the government and Lehman Brothers in the six month period preceding Lehman's bankruptcy filing, starting with the bailout of Bear Stearns. By examining the interaction where Lehman acted under incomplete information due to the government's policy of constructive ambiguity, I demonstrated how we arrived at the outcome where Lehman Brothers filed for bankruptcy. Before that, I showed that had the game been played under complete information, the equilibrium strategies would have resulted in Lehman Brothers finding a solution in the market. These are the central findings in my thesis: Had the government been able to signal to Lehman Brothers in a credible way that no bailout was forthcoming, there is reason to believe that the outcome would have been different.

I identified the government's choice of policy – constructive ambiguity – as the reason *why* the government did not succeed in making Lehman change its strategy. After having bailed out Bear Stearns, there was simply no easy way for the government to credibly convey the message to the financial markets that the implicit insurance inherent in government bailouts would not be handed out if financial institutions stood in danger of failing. Thus, when the day came that Lehman stood on the verge of bankruptcy, it was too late for Lehman to find a buyer, and the government deemed a bailout too expensive in terms of the moral hazard and the economical and political costs such a move would imply.

In discussing the policy of constructive ambiguity as it was applied preceding Lehman brother's failure, I found the policy to be theoretically flawed due to the consequences of the time inconsistency problem inherent in the discretion that comes with it, coupled with governments' eagerness to bail out systemically significant financial institutions in order to avoid the spill-overs that follow their failure. I further showed that even if the government could impose a randomizing mechanism – which would boost the deterrent effect that ideally should follow the policy – the policy would be unattractive due to the fact that fundamentally sound financial institutions can fail due to market imperfections even if behaviour has been prudent. In other words, even when addressing the problems inherent in government discretion, the policy could allow failure even when a rescue would in all likelihood be beneficial for the economy as a whole.

In the analysis, I undertook several simplifying measures in order to account for the interaction between the government and Lehman Brothers. The validity of my findings rests on the assumption that these simplifying steps hold empirically. Furthermore, I have relied heavily on secondary sources for the empirical account in this thesis. Even when all precautions are taken to assure the reliability of secondary sources, one can never guarantee completely that their presentation of reality is correct. Furthermore there is the possibility that the bias inherent in secondary sources' accounts has gone by undetected in my research.

It is also possible that portraying the entire period between Bear Stearns' bailout and Lehman's failure as one game is a flawed approach. This may be the most significant critique of my approach, since it is not unlikely that the government may have preferred to bail Lehman out during parts of this period. It is theoretically possible that the government preferred to bail Lehman out up until the very day of Lehman filing for bankruptcy. It is particularly conceivable that the government after bailing out Fannie Mae and Freddy Mac adjusted its perception of the political cost and the effect a bailout would have on moral hazard upwards, maybe sufficiently to go from preferring to bail Lehman out to preferring to let it go under. This would explain why the government did not announce that a bailout would not be forthcoming before the 12th of September. My counterargument here is that it does not matter for the outcome

of the game what the government's preferences really are; all that matters is Lehman's perception of these preferences. Furthermore, I have shown that, even if the government had announced earlier that no bailout was forthcoming, it is unlikely that it would have altered Lehman's estimate of the deciding parameters to any significant degree, as the statements' signalling effect would be subordinate to that of the government's actions.

There is no doubt letting Lehman go under did an outstanding job for lowering moral hazard and regain momentum for constructive ambiguity. That effect, however, in all likelihood lasted shortly – until AIG was bailed out the following day. Soon after, the government would proclaim that the TBTF doctrine was implemented and constructive ambiguity abandoned as an approach to meeting financial institutions in distress. This indicates that the government cannot have its cake and eat it too – if it wants financial institutions not to expect being bailed out, it cannot provide bailouts to financial institutions. In all likelihood, preventing systemic risk has to come from elsewhere than constructive ambiguity.

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